

# **EPA Petition File**

## **PP6E4742**

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John A. Richards, Director  
Federal Register Staff

*Indira Gavola 7505C*

# ENVIRONMENTAL PROTECTION AGENCY

## 40 CFR Part 180

[OPP-300728; FRL-6032-2]

RIN 2070-AB78

### Alder Bark; Exemption from the Requirement of a Tolerance

AGENCY: Environmental Protection Agency (EPA).

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**ACTION:** Final rule.

**SUMMARY:** This regulation establishes an exemption from the requirement of a tolerance for residues of alder bark when used as an inert ingredient (seed germination stimulator) in pesticide formulations applied to growing crops. Platte Chemical Company requested this tolerance exemption under the Federal Food, Drug and Cosmetic Act (FFDCA), as amended by the Food Quality Protection Act of 1996 (Pub. L. 104-170).

**DATES:** This regulation is effective [*insert date of publication in the Federal Register*]. Objections and requests for hearings must be received by EPA on or before [*insert date 30 days after date of publication in the Federal Register*].

**ADDRESSES:** Written objections and hearing requests, identified by the docket control number, [OPP-300728], must be submitted to: Hearing Clerk (1900), Environmental Protection Agency, Rm. M3708, 401 M St., SW., Washington, DC 20460. Fees accompanying objections and hearing requests shall be labeled "Tolerance Petition Fees" and forwarded to: EPA Headquarters Accounting Operations Branch, OPP (Tolerance Fees), P.O. Box 360277M, Pittsburgh, PA 15251. A copy of any objections and hearing requests filed with the Hearing Clerk identified by the docket control number, [OPP-300728], must also be submitted to: Public Information and Records Integrity Branch, Information Resources and Services Division (7502C), Office of Pesticide Programs, Environmental Protection Agency, 401 M St., SW., Washington, DC 20460. In person, bring a copy of objections and hearing requests to Rm. 119, CM #2, 1921 Jefferson Davis Hwy., Arlington, VA.

A copy of objections and hearing requests filed with the Hearing Clerk may also be submitted electronically by sending electronic mail (e-mail) to: opp-docket@epamail.epa.gov. Copies of objections and hearing requests must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Copies of objections and hearing requests will also be accepted on disks in WordPerfect 5.1 file format or ASCII file format. All copies of objections and hearing requests in electronic form must be identified by the docket control number [OPP-300728]. No Confidential Business Information (CBI) should be submitted through e-mail. Electronic copies of objections and hearing requests on this rule may be filed online at many Federal Depository Libraries.

988-1747

**FOR FURTHER INFORMATION CONTACT:** By mail: Indira Gairola, Registration Division 7505C, Office of Pesticide Programs, Environmental Protection Agency, 401 M St., SW., Washington, DC 20460. Office location, telephone number, and e-mail address: Rm. #707G, Crystal Mall #2, 1921 Crystal Drive, Arlington, VA, 22202. Telephone No. (703)-308-8371, e-mail: gairola.indira@epamail.epa.gov.

**SUPPLEMENTARY INFORMATION:** In the **Federal Register** of April 29, 1998 (63 FR 23438)(FRL-5783-4) EPA issued a notice pursuant to section 408 of the FFDCA, 21 U.S.C. 346a announcing the filing of a pesticide petition (PP) 6E4742 for a tolerance exemption from Platte Chemical Company, 419 18th Street, P.O. Box 667, Greeley, CO 80632, This notice included a summary of the petition prepared by Platte Chemical Company, the petitioner. There were no comments received in response to the notice of filing.

The petition requested that 40 CFR 180.1001(d) be amended by establishing an exemption from the requirement of a tolerance for residues of the inert ingredient alder bark when used as an inert ingredient (seed germination stimulator) in pesticide formulations applied to growing crops only.

### **I. Risk Assessment and Statutory Findings**

New section 408(b)(2)(A)(i) of the FFDCA allows EPA to establish a tolerance (the legal limit for a pesticide chemical residue in or on a food) only if EPA determines that the tolerance is "safe." Section 408(b)(2)(A)(ii) defines "safe" to mean that "there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information." This includes exposure through drinking water and in residential settings, but does not include occupational exposure. Section 408(b)(2)(C) requires EPA to give special consideration to exposure of infants and children to the pesticide chemical residue in establishing a tolerance and to "ensure that there is a reasonable certainty that no harm will result to infants and children from aggregate exposure to the pesticide chemical residue. . . ."

EPA performs a number of analyses to determine the risks from aggregate exposure to pesticide residues. First, EPA determines the toxicity of pesticides based primarily on toxicological studies using laboratory animals. These studies address many adverse health effects, including (but not limited to) reproductive effects, developmental toxicity, toxicity to the nervous system, and carcinogenicity. Second, EPA examines exposure to the pesticide through the diet (e.g., food and drinking water) and through exposures that occur as a result of pesticide use in residential settings.

### **II. Inert Ingredient Definition**

Inert ingredients are all ingredients that are not active ingredients as defined in 40 CFR 153.125 and include, but are not limited to, the following types of ingredients (except when they have a pesticidal efficacy of their own): solvents such as alcohols and hydrocarbons; surfactant such as polyoxyethylene polymers and fatty acids; carriers such as clay and diatomaceous earth; thickeners such as carrageenan and modified cellulose; wetting, spreading, and dispersing agents; propellants in aerosol dispensers; microencapsulating agents; and emulsifiers. The

term "inert" is not intended to imply nontoxicity; the ingredient may or may not be chemically active. Generally, EPA has exempted inert ingredients from the requirement of a tolerance based on the low toxicity of the individual inert ingredients.

### III. Risk Assessment and Statutory Findings

EPA establishes exemptions from the requirement of a tolerance only in those cases where it can be clearly demonstrated that the risks from aggregate exposure to pesticide chemical residues under reasonably foreseeable circumstances will pose no appreciable risks to human health. In order to determine the risks from aggregate exposure to pesticide inert ingredients, the Agency considers the toxicity of the inert ingredient in conjunction with possible exposure to residues of the inert ingredient in food, drinking water, and other nonoccupational exposures. If EPA is able to determine that a finite tolerance is not necessary to ensure that there is a reasonable certainty that no harm will result from aggregate exposure to the inert ingredient, an exemption from the requirement of a tolerance may be established.

### IV. Aggregate Risk Assessment and Determination of Safety

Consistent with section 408(b)(2)(D), EPA has reviewed the available scientific data and other relevant information in support of this action, EPA has sufficient data to assess the hazards of alder bark and to make a determination on aggregate exposure, consistent with section 408(b)(2), an exemption from the requirement of a tolerance for residues of alder bark when used as an inert ingredient in pesticide formulations applied to growing crops. EPA's assessment of the dietary exposures and risks associated with establishing an exemption from the requirement of a tolerance follows.

The data submitted in the petition and other relevant material have been evaluated. As part of the EPA policy statement on inert ingredients published in the **Federal Register** of April 22, 1987 (52 FR 13305) (FRL-3190-1), the Agency set forth a list of studies which would generally be used to evaluate the risks posed by the presence of an inert ingredient in a pesticide formulation. However, where it can be determined without that data that the inert ingredient will present minimal or no risk, the Agency generally does not require some or all of the listed studies to rule on the proposed tolerance or exemption from the requirement of a tolerance for an inert ingredient.

#### A. Toxicological Profile

Alder bark is the bark of an alder tree (*Alnus glutinosa*) that has been dried and ground into a powder or flour form. The use of alder bark as an inert ingredient in pesticide formulations is not expected to result in adverse effects since it is primarily comprised of lignin, hemicellulose and cellulose, each of which has been extensively studied and been found not to exhibit any adverse toxicological effects.

#### B. Exposures and Risks

1. *From food and feed uses, drinking water, and non-dietary exposures.* For the purposes of assessing the potential dietary exposure, EPA considered that

under this tolerance exemption alder bark could be present in all raw and processed agricultural commodities and drinking water and that non-occupational, non-dietary exposure was possible. However, based on the use of alder bark as a seed germination stimulator, it is likely that residues of alder bark would not be present in or on food or drinking water. EPA therefore concludes that, based on the lack of expected adverse effects and the lack of expected residues of alder bark in or on raw agricultural commodities or drinking water, there are no concerns for risks associated with any exposure scenarios that are reasonably foreseeable.

*2. Cumulative exposure to substances with common mechanism of toxicity.*

Section 408(b)(2)(D)(v) requires that, when considering whether to establish, modify, or revoke a tolerance, the Agency consider "available information" concerning the cumulative effects of a particular pesticide's residues and "other substances that have a common mechanism of toxicity." Because EPA has concluded that alder bark is basically non-toxic, EPA has not assumed that alder bark has a common mechanism of toxicity with other substances.

*C. Aggregate Risks and Determination of Safety for U.S. Population*

Based on the lack of expected adverse effects resulting from the use of alder bark, EPA concludes that there is a reasonable certainty that no harm to the U.S. population will result from aggregate exposure to alder bark. EPA believes this compound presents no dietary risk under reasonably foreseeable circumstances.

*D. Aggregate Risks and Determination of Safety for Infants and Children*

FFDCA section 408 provides that EPA shall apply an additional tenfold margin of safety for infants and children in the case of threshold effects to account for pre-and postnatal toxicity and the completeness of the database unless EPA determines that a different margin of safety will be safe for infants and children. Margins of safety are incorporated into EPA risk assessments either directly through use of a MOE analysis or through using uncertainty (safety) factors in calculating a dose level that poses no appreciable risk to humans.

In this instance, the Agency believes that there are reliable data to support that fact that alder bark would be expected to be practically nontoxic to humans, and thus EPA has not used a safety factor analysis in assessing the risk of this compound. For the same reasons the additional safety factor is unnecessary.

*E. International Residue Limits*

No Codex maximum residue levels have been established for alder bark.

**V. Conclusion**

Therefore, an exemption from the requirement of a tolerance is established for residues of alder bark when used as an inert ingredient in pesticide formulations applied to growing crops.

## VI. Objections and Hearing Requests

The new FFDCa section 408(g) provides essentially the same process for persons to "object" to a tolerance regulation issued by EPA under new section 408(e) and (l)(6) as was provided in the old section 408 and in section 409. However, the period for filing objections is 60 days, rather than 30 days. EPA currently has procedural regulations which govern the submission of objections and hearing requests. These regulations will require some modification to reflect the new law. However, until those modifications can be made, EPA will continue to use those procedural regulations with appropriate adjustments to reflect the new law.

Any person may, by *[insert date 60 days after date of publication in the Federal Register]*, file written objections to any aspect of this regulation and may also request a hearing on those objections. Objections and hearing requests must be filed with the Hearing Clerk, at the address given above (40 CFR 178.20). A copy of the objections and/or hearing requests filed with the Hearing Clerk should be submitted to the OPP docket for this rulemaking. The objections submitted must specify the provisions of the regulation deemed objectionable and the grounds for the objections (40 CFR 178.25). Each objection must be accompanied by the fee prescribed by 40 CFR 180.33(i). If a hearing is requested, the objections must include a statement of the factual issues on which a hearing is requested, the requestor's contentions on such issues, and a summary of any evidence relied upon by the requestor (40 CFR 178.27). A request for a hearing will be granted if the Administrator determines that the material submitted shows the following: There is genuine and substantial issue of fact; there is a reasonable possibility that available evidence identified by the requestor would, if established, resolve one or more of such issues in favor of the requestor, taking into account uncontested claims or facts to the contrary; and resolution of the factual issues in the manner sought by the requestor would be adequate to justify the action requested (40 CFR 178.32). Information submitted in connection with an objection or hearing request may be claimed confidential by marking any part or all of that information as Confidential Business Information (CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2. A copy of the information that does not contain CBI must be submitted for inclusion in the public record. Information not marked confidential may be disclosed publicly by EPA without prior notice.

## VII. Public Record and Electronic Submissions

EPA has established a record for this rulemaking under docket control number [OPP-300728] (including any comments and data submitted electronically). A public version of this record, including printed, paper versions of electronic comments, which does not include any information claimed as CBI, is available for inspection from 8:30 a.m. to 4 p.m., Monday through Friday, excluding legal holidays. The public record is located in Room 119 of the Public Information and Records Integrity Branch, Information Resources and Services Division (7502C), Office of Pesticide Programs, Environmental Protection Agency, Crystal Mall #2, 1921 Jefferson Davis Highway, Arlington, VA.

Electronic comments can be sent directly to EPA at:

opp-docket@epamail.epa.gov

The official record for this rulemaking, as well as the public version, as described above will be kept in paper form. Accordingly, EPA will transfer any copies of objections and hearing requests received electronically into printed, paper form as they are received and will place the paper copies in the official rulemaking record which will also include all comments submitted directly in writing. The official rulemaking record is the paper record maintained at the Virginia address in "ADDRESSES" at the beginning of this document.

## **VIII. Regulatory Assessment Requirements**

### **A. Certain Acts and Executive Orders**

This final rule establishes an exemption from the requirement of a tolerance under FFDCA section 408(d) in response to a petition submitted to the Agency. The Office of Management and Budget (OMB) has exempted these types of actions from review under Executive Order 12866, entitled *Regulatory Planning and Review* (58 FR 51735, October 4, 1993). This final rule does not contain any information collections subject to OMB approval under the Paperwork Reduction Act (PRA), 44 U.S.C. 3501 et seq., or impose any enforceable duty or contain any unfunded mandate as described under Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) (Pub. L. 104-4). Nor does it require considerations as required by Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629, February 16, 1994), or require OMB review in accordance with Executive Order 13045, entitled *Protection of Children from Environmental Health Risks and Safety Risks* (62 FR 19885, April 23, 1997).

In addition, since these tolerances and exemptions that are established on the basis of a petition under FFDCA section 408(d), such as the tolerance exemption in this final rule, do not require the issuance of a proposed rule, the requirements of the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 et seq.) do not apply. Nevertheless, the Agency has previously assessed whether establishing tolerances, exemptions from tolerances, raising tolerance levels or expanding exemptions might adversely impact small entities and concluded, as a generic matter, that there is no adverse economic impact. The factual basis for the Agency's generic certification for tolerance actions published on May 4, 1981 (46 FR 24950) and was provided to the Chief Counsel for Advocacy of the Small Business Administration.

### **B. Executive Order 12875**

Under Executive Order 12875, entitled *Enhancing Intergovernmental Partnerships* (58 FR 58093, October 28, 1993), EPA may not issue a regulation that is not required by statute and that creates a mandate upon a State, local or tribal government, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by those governments. If the mandate is unfunded, EPA must provide to the Office of Management and Budget (OMB) a description of the extent of EPA's prior consultation with representatives of affected State, local and tribal governments, the nature of their concerns, copies of any written communications from the governments, and a statement supporting

the need to issue the regulation. In addition, Executive Order 12875 requires EPA to develop an effective process permitting elected officials and other representatives of State, local and tribal governments "to provide meaningful and timely input in the development of regulatory proposals containing significant unfunded mandates."

Today's rule does not create an unfunded federal mandate on State, local or tribal governments. The rule does not impose any enforceable duties on these entities. Accordingly, the requirements of section 1(a) of Executive Order 12875 do not apply to this rule.

### *C. Executive Order 13084*

Under Executive Order 13084, entitled *Consultation and Coordination with Indian Tribal Governments* (63 FR 27655, May 19, 1998), EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments. If the mandate is unfunded, EPA must provide OMB, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected and other representatives of Indian tribal governments "to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities."

Today's rule does not significantly or uniquely affect the communities of Indian tribal governments. This action does not involve or impose any requirements that affect Indian Tribes. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

### **IX. Submission to Congress and the Comptroller General**

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the Agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. This rule is not a "major rule" as defined by 5 U.S.C. 804(2).

**List of Subjects in 40 CFR Part 180**

Environmental protection, Administrative practice and procedure,  
Agricultural commodities, Pesticides and pests, Reporting and recordkeeping  
requirements.

Dated: September 24, 1998

Arnold E. Leape ~~for~~ acting

(99)

Director, Registration Division, Office of Pesticide Programs.

Emily Glover

Confirmed to be a true  
copy of the original

Therefore, 40 CFR chapter I is amended as follows:

**PART 180—[AMENDED]**

1. The authority citation for part 180 continues to read as follows:

**Authority:** 21 U.S.C. 346a and 371.

2. In § 180.1001 the table in paragraph (d) is amended by adding alphabetically the following inert ingredient to read as follows:

**§ 180.1001 Exemptions from the requirements of a tolerance.**

\* \* \* \* \*

(d) \* \* \*

Inert Ingredients	Limits	Uses
Alder bark . . . . .	. . . . .	. Seed germination stimulator
. . . . .	. . . . .	.

[FR Doc. 98-????? Filed ??-??-98; 8:45 am]

**BILLING CODE 6560-50-F**



United States  
Environmental Protection Agency  
Washington, DC 20460

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2. SUBMITTING ACTIVITY Registration Division		3. ASSIGNED FRL NUMBER (include alpha & numeric characters for identification.) 6032-2	
4. OPEN REQUESTION NUMBER 111-73-98		5. BILLING CODE 6560-50-F	
6. FORWARDED TO OSA, NAME - SIGNATURE			DATE
7. NUMBER OF MANUSCRIPT PAGES	8. ESTIMATED NUMBER OF COLUMNS	9. ESTIMATED COST \$816.00	
10. SIGNATURE: (a) REQUESTING OFFICER <i>Indira Gairde</i>		11. SIGNATURE: (a) FEDERAL REGISTER DESIGNEE <i>Presulla L. Graves</i>	
(b) DATE 09/23/98	(c) TELEPHONE NUMBER (703) 308-8371	(b) DATE 09/23/98	(c) TELEPHONE NUMBER (703) 305-6921
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James L. Graves

98P-1747

## 13. Financial and Accounting Data

Line	DCN (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	SFO
1	C10175	98/99	15	32200FEQ	9320	2403	2
2							
3							

Line	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1	816.00			
2				
3				

# ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 180

[OPP-300728; FRL-6032-2]

RIN 2070-AB78

## Alder Bark; Exemption from the Requirement of a Tolerance

AGENCY: Environmental Protection Agency (EPA).

**ACTION:** Final rule.

**SUMMARY:** This regulation establishes an exemption from the requirement of a tolerance for residues of alder bark when used as an inert ingredient (seed germination stimulator) in pesticide formulations applied to growing crops. Platte Chemical Company requested this tolerance exemption under the Federal Food, Drug and Cosmetic Act (FFDCA), as amended by the Food Quality Protection Act of 1996 (Pub. L. 104-170).

**DATES:** This regulation is effective [insert date of publication in the Federal Register]. Objections and requests for hearings must be received by EPA on or before [insert date 30 days after date of publication in the Federal Register].

**ADDRESSES:** Written objections and hearing requests, identified by the docket control number, [OPP-300728], must be submitted to: Hearing Clerk (1900), Environmental Protection Agency, Rm. M3708, 401 M St., SW., Washington, DC 20460. Fees accompanying objections and hearing requests shall be labeled "Tolerance Petition Fees" and forwarded to: EPA Headquarters Accounting Operations Branch, OPP (Tolerance Fees), P.O. Box 360277M, Pittsburgh, PA 15251. A copy of any objections and hearing requests filed with the Hearing Clerk identified by the docket control number, [OPP-300728], must also be submitted to: Public Information and Records Integrity Branch, Information Resources and Services Division (7502C), Office of Pesticide Programs, Environmental Protection Agency, 401 M St., SW., Washington, DC 20460. In person, bring a copy of objections and hearing requests to Rm. 119, CM #2, 1921 Jefferson Davis Hwy., Arlington, VA.

A copy of objections and hearing requests filed with the Hearing Clerk may also be submitted electronically by sending electronic mail (e-mail) to: opp-docket@epamail.epa.gov. Copies of objections and hearing requests must be

98P-1747

CONCURRENCES							
SYMBOL	7104	7104	7505C	7505C	7505C		
SURNAME	Thames	Thames	Thames	Thames	Thames		
DATE	9/22/98	9/22/98	9/23/98	9/24/98	9/24/98		

List of Subjects in 40 CFR Part 180

Environmental protection, Administrative practice and procedure,  
Agricultural commodities, Pesticides and pests, Reporting and recordkeeping  
requirements.

Dated: September 24, 1998

*Arnold E. Leigue for*

Director, Registration Division, Office of Pesticide Programs.

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John A. Richards, Director  
Federal Register Staff

*Indira Gairola 7505W*

# ENVIRONMENTAL PROTECTION AGENCY

[PF-803; FRL-5783-4]

## Notice of Filing of Pesticide Petitions

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice.

**SUMMARY:** This notice announces the initial filing of pesticide petitions proposing the establishment of regulations for residues of certain pesticide chemicals in or on various food commodities.

**DATES:** Comments, identified by the docket control number PF-803, must be received on or before *(insert date 30 days after date of publication in the Federal Register)*.

**ADDRESSES:** By mail submit written comments to: Public Information and Records Integrity Branch, Information Resources and Services Division (7502C), Office of Pesticides Programs, Environmental Protection Agency, 401 M St., SW., Washington, DC 20460. In person bring comments to: Rm. 1132, CM #2, 1921 Jefferson Davis Highway, Arlington, VA.

Comments and data may also be submitted electronically by following the instructions under "SUPPLEMENTARY INFORMATION." No confidential business information should be submitted through e-mail.

Information submitted as a comment concerning this document may be claimed confidential by marking any part or all of that information as "Confidential Business Information" (CBI). CBI should not be submitted through e-mail. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 CFR part 2. A copy of the comment that does not contain CBI must be submitted for inclusion in the public record. Information not marked confidential may be disclosed publicly by EPA without prior notice. All written comments will be available for public inspection in Rm. 1132 at the address given above, from 8:30 a.m. to 4 p.m., Monday through Friday, excluding legal holidays.

**FOR FURTHER INFORMATION CONTACT:** The product manager listed in the table below:

Product Manager	Office location/telephone number	Address
Bipin Gandhi (PM-5) .....	Rm. 4W53, CS #1, 703-308-8380, e-mail: gandhi.bipin@epamail.epa.gov.	1921 Jefferson Davis Hwy, Arlington, VA
Indira Gairola .....	Rm. 4W57, CS #1, 703-308-8371, e-mail: gairola.indira@epamail.epa.gov.	Do.

**SUPPLEMENTARY INFORMATION:** EPA has received pesticide petitions as follows proposing the establishment and/or amendment of regulations for residues of certain pesticide chemicals in or on various food commodities under section 408 of the Federal Food, Drug, and Comestic Act (FFDCA), 21 U.S.C. 346a. EPA has determined that these petitions contain data or information regarding the elements set forth in section 408(d)(2); however, EPA has not fully evaluated

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the sufficiency of the submitted data at this time or whether the data supports granting of the petition. Additional data may be needed before EPA rules on the petition.

The official record for this notice of filing, as well as the public version, has been established for this notice of filing under docket control number [PF-803] (including comments and data submitted electronically as described below). A public version of this record, including printed, paper versions of electronic comments, which does not include any information claimed as CBI, is available for inspection from 8:30 a.m. to 4 p.m., Monday through Friday, excluding legal holidays. The official record is located at the address in "ADDRESSES" at the beginning of this document.

Electronic comments can be sent directly to EPA at:

opp-docket@epamail.epa.gov

Electronic comments must be submitted as an ASCII file avoiding the use of special characters and any form of encryption. Comment and data will also be accepted on disks in Wordperfect 5.1 file format or ASCII file format. All comments and data in electronic form must be identified by the docket number (insert docket number) and appropriate petition number. Electronic comments on notice may be filed online at many Federal Depository Libraries.

#### List of Subjects

Environmental protection, Agricultural commodities, Food additives, Feed additives, Pesticides and pests, Reporting and recordkeeping requirements.

Dated: APR 13 1998



Susan Lewis, Acting  
Director, Registration Division, Office of Pesticide Programs.



Certified to be a true  
copy of the original.

## Summaries of Petitions

Petitioner summaries of the pesticide petitions are printed below as required by section 408(d)(3) of the FFDCA. The summaries of the petitions were prepared by the petitioners and represent the views of the petitioners. EPA is publishing the petition summaries verbatim without editing them in any way. The petition summary announces the availability of a description of the analytical methods available to EPA for the detection and measurement of the pesticide chemical residues or an explanation of why no such method is needed.

### 1. BFGoodrich Specialty Chemicals

*PP 8E4958, 8E4961, 8E4962*

EPA has received a pesticide petition (PP 8E4958, 8E4961, 8E4962) from BFGoodrich Specialty Chemicals, 9911 Brecksville Road, Cleveland, OH 44141, proposing pursuant to section 408(d) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. 346a(d), to amend 40 CFR part 180 to establish an exemption from the requirement of a tolerance for acrylic acid terpolymer, partial sodium salt in or on raw agricultural commodities when used as inert ingredients in the pesticide formulations applied to growing crops, raw agricultural commodities after harvest or to animals, under 40 CFR 180.1001(c) and (e). EPA has determined that the petition contains data or information regarding the elements set forth in section 408(d)(2) of the FFDCA; however, EPA has not fully evaluated the sufficiency of the submitted data at this time or whether the data supports granting of the petition. Additional data may be needed before EPA rules on the petition.

#### A. Toxicological Profile

The Acrylate Terpolymers Good-RiteK-781, K-797, and K-798 conform to the definition of polymer given in 40 CFR 723.250(b) and meets the following criteria that are used to identify low risk polymers:

1. The Acrylate Terpolymers are not cationic polymers, nor are they reasonably anticipated to become cationic polymers in a natural aquatic environment.
2. The Acrylate Terpolymers contain as an integral part of their composition the atomic elements carbon, hydrogen, oxygen, sulfur and nitrogen. It also contains the monatomic counterion Na<sup>+</sup>.
3. The Acrylate Terpolymers do not contain as an integral part of their composition, except as impurities, any elements other than those listed in 40 CFR 723.250(d)(2)(ii).
4. The Acrylate Terpolymers are not designed, nor are they reasonably anticipated to substantially degrade, decompose, or depolymerize.
5. The Acrylate Terpolymers are not manufactured or imported from monomers and/or other reactants that are not already included on the Toxic Substances Control Act (TSCA) Chemical Substance Inventory or manufactured under an applicable TSCA Section 5 exemption.

6. The Acrylate Terpolymers are not water absorbing polymers.

7. The only reactive functional groups the Acrylate Terpolymers contain is a carboxylic acid.

8. The Acrylate Terpolymers have a number average molecular weight greater than 1,000 and less than 10,000 Daltons (and oligomer content less than 10 percent below MW 500 and less than 25 percent below MW 1,000).

#### *B. Aggregate Exposure*

In the past decade Acrylate copolymers and terpolymers have been used in a variety of applications, most notably water treatment including boiler and retort waters, cooling waters, membrane separations systems and are now de rigor in these applications. In these and similar applications, reasonable levels of incidental exposure to the neat polymer is expected and accepted without regard. ANSI/NSF Standard 60 Drinking Water Treatment Chemical Additives listing has been extended to similar acrylate co-and ter-polymers. The chemical characteristics of these polymers and the published health and safety data indicates that aggregate exposure to Acrylate terpolymers, as listed in the current petitions, as inert ingredients in the preparation and application of pesticide formulations for use on growing crops, raw agricultural commodities after harvest or to animals poses no harm.

#### *C. Cumulative Effects*

At this time there is no information to indicate that any toxic effects produced by the Acrylate terpolymers would be cumulative with those of any other chemical. Given the terpolymers' categorization as "low risk polymers" (40 CFR 723.250) and their proposed use as inert ingredients in pesticide formulations, there is no reasonable expectations of increased risk due to cumulative exposure to the Acrylate terpolymers.

#### *D. International Tolerances*

BFGoodrich is petitioning that the Acrylate terpolymers be exempt from the requirement of a tolerance based upon their status as low risk polymers as per 40 CFR 723.250. Therefore, an analytical method to determine residues of the Acrylate terpolymers in raw agricultural commodities treated with pesticide formulations containing the Acrylate terpolymers has not been proposed.

There are no Codex maximum residue levels(MRLs) established for the Acrylate terpolymers. (Bipin Gandhi)

### **2. Platte Chemical Company**

*PP 6E4742*

EPA has received a pesticide petition (PP 6E4742) from Platte Chemical Company, 419 18th Street, P.O. Box 667, Greeley, CO 80632, proposing pursuant to section 408(d) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. 346a(d), to amend 40 CFR part 80 to establish an exemption from the requirement of a tolerance for residues of the inert ingredient Modal Alder Bark (MAB) alder bark flour (ABF) when used in pesticide formulations applied to growing crops,

or in or on raw agricultural commodities after harvest. EPA has determined that the petition contains data or information regarding the elements set forth in section 408(d)(2) of the FFDCA; however, EPA has not fully evaluated the sufficiency of the submitted data at this time or whether the data supports granting of the petition. Additional data may be needed before EPA rules on the petition.

#### A. Residue Chemistry

1. *Plant metabolism.* MAB is not absorbed or metabolized by plants. The ABF remains on the treated surface, where it decomposes to its natural constituents including, cellulose, hemicelluloses, lignin and various compounds such as suberins and phenolic acids. These decomposition products are further degraded by various bacteria and fungi to simple sugars, carbohydrates, gases and other molecular compounds. Eventually ABF will be completely decomposed by natural processes to nutrients which can be utilized by other plants.

2. *Analytical method.* No analytical method is available for determining MAB, *per se*. Although various methods are available to determine the various components of alder bark (e.g., content of cellulose, lignin, polysaccharides, etc.), these methods are not specific to MAB and can not distinguish whether the components are derived from ABF or from other plant or soil sources.

3. *Magnitude of residues.* Since ABF is not absorbed or metabolized by plants, no residues of MAB are expected to result in or on raw agricultural commodities. For example, potato commodities grown from seed potato pieces treated with formulations containing MAB do not have residues of the inert ingredient. Furthermore, any residues would be associated with the potato seed pieces, which shrivel as the daughter plants withdraw nutrients during "seedling" growth. Consequently, the spent seed pieces are not harvested and will not be eaten. Finally, any MAB adhering to the harvested potatoes would be removed by brushing and washing.

#### B. Toxicological Profile

1. *Acute toxicity.* The use of MAB (ABF) as an inert ingredient in pesticide formulations is not expected to result in adverse effects due to its non-hazardous character, minimal potential for exposure, and projected absence of dietary exposure. There is a wealth of available information about the absence of, or minor health effects from, exposure to various wood flours, dusts, shavings, and other wood/bark components. Ingestion of wood flour, sawdust or wood shavings is neither lethal, nor toxic, and is even considered to be a source of non-nutritive dietary fiber. Dermal contact with wood or bark flour is not associated with death or toxicity, although dermal allergies (contact dermatitis) have been reported in certain sensitive individuals. Acute inhalation exposure to wood dusts for a limited time is not considered to be an occupational hazard if dust levels are below established Permissible Exposure Levels (PEL) for non-toxic particulate matter (i.e., unspecified dust particles). MAB is not expected to produce any more eye irritation than any chemically inert particulate, such as clay or wheat flour. In persons who may have a specific alder wood allergy, eye irritation or conjunctivitis is possible even though there are no known reports of such

incidences. Alder wood dust is not a sensitizer nor is ABF expected to be a sensitizer.

2. *Genotoxicity*. Evidence from studies with wood-related compounds indicate that MAB is not genotoxic. ABF is composed mostly of cellulose, hemicelluloses and lignins, which are not mutagenic.

3. *Reproductive and developmental toxicity*. MAB is not expected to be a developmental or reproductive toxin, based on extensive testing of the three principle components (cellulose, hemicelluloses and lignins) of ABF. Additionally, wood flours have been used for numerous years to increase dietary fiber in animal feeds and human diets with no known adverse reproductive or developmental toxicity.

4. *Subchronic toxicity*. There is no subchronic exposure to MAB from its use as a pesticidally inert ingredient. However, chronic toxicity data adequately address possible toxicological effects that may result from subchronic exposure to ABF.

5. *Chronic toxicity*. There is minimal-to-no chronic toxicological risk from the use of MAB as an inert ingredient in pesticide formulations. There are no known adverse reactions to chronic consumption or ingestion of wood flour. Ingestion of wood flour, sawdust or wood shavings for extended periods of time is not hazardous. Instead, it is considered to be a non-nutritive dietary supplement. In fact, the Food and Drug Administration (FDA) has allowed the use of wood flours in various prepared foods, such as bread, to increase dietary fiber levels and reduce caloric intake.

Adverse effects of exposure to wood dust are limited to allergic reactions, such as rhinitis and contact dermatitis, and from chronic (lifetime) occupational exposure (*via* inhalation) to high concentrations of wood dust. Based on the absence of chronic effects from ingestion, the limited irritant and allergic effects from dermal contact, limited exposure to ABF from seed potato treatment, and the absence of chronic exposure by any route, Platte Chemical Company concludes that there is minimal-to-no chronic toxicological risk from the use of MAB in pesticide products.

6. *Animal metabolism*. There is no known human metabolism or metabolic products from human ingestion of non-nutritive dietary fiber from wood products. In humans, the polymers of plants such as cellulose from plant cell walls (linkages), some pectins, hemicellulose, gums, mucilages and lignin, are not easily digested and are passed through the gastrointestinal tract as non-nutritive dietary fiber. Wood flour and sawdust are commonly used in animal feeds. In ruminants, such wood products are reduced to cellulose, hemicelluloses and lignins by endogenous bacterial/microbial populations in the gut. These wood product degradates are further reduced to simple sugars, carbohydrates, carbon dioxide and indigestible biomass. The indigestible biomass is readily excreted.

7. *Metabolite toxicology*. There is no known evidence of metabolite toxicity from the ingestion of wood or ABF by either livestock or humans. In humans,

no metabolites are produced after ingestion of non-nutritive dietary fiber such as ABF.

8. *Endocrine disruption.* No endocrine or estrogenic effects are expected from the use of MAB for the following reasons:

- i. The production of MAB includes oven drying the bark, which removes moisture and volatile organic compounds.
- ii. ABF does not penetrate and will not be absorbed by skin.
- iii. Alder bark is primarily composed of naturally-occurring, non-digestible cellulose, hemicelluloses and lignin; and most importantly.
- iv. There is no non-occupational exposure to MAB when used as a pesticidally inert ingredient.

### C. Aggregate Exposure

1. *Dietary exposure.* Ingestion of MAB or its residues would simply increase the level of non-nutritive fiber in the diet, which has been shown to have beneficial health effects by reducing the incidence of diverticulosis, cancer of the colon and coronary heart disease as well as facilitating weight loss. Also, health claims for fiber-containing foods have been made for more than a century and the effects of fiber in promoting bowel evacuation are widely recognized.

2. *Food.* The use of MAB in potato seed piece pesticides does not result in any significant dietary exposure to ABF. Residues, if any, surround the potato seed pieces, which shrivel as the daughter plants withdraw nutrients during "seedling" growth. Consequentially, the spent seed pieces are not harvested and will not be eaten. Brushing and washing potatoes to remove particulates, such as soil, would simultaneously remove any residues of MAB. However, should ABF residues adhere to harvested potatoes, the only effect would be to increase the level of non-nutritive dietary fiber. Were this to be the case, ingestion of MAB residues would be beneficial and of no toxicological concern since MAB can be considered to be a non-nutritive source of dietary fiber, which has been shown to improve health and lessen the incidence of diverticulosis, colon cancer and coronary heart disease.

3. *Drinking water.* The use of MAB as an inert ingredient in pesticide formulations does not lead to alder bark particles in the drinking water. Wood and bark particles do not leach into the groundwater. Any particles that may be transported into water bodies will absorb moisture and either sediment out of the water column or be removed with other particulate matter during drinking water treatment. Similarly, any natural water-extractable components (humic acids, fulvic acids, etc.) of MAB are natural products that will also be removed during drinking water treatment.

4. *Non-dietary exposure.* The only anticipated human exposure to MAB from non-dietary sources would be through occupational exposure during product use.

#### *D. Cumulative Effects*

The use of MAB as an inert ingredient in pesticide formulations does not result in any cumulative effects, since there is no non-occupational exposure to MAB.

#### *E. Safety Determination*

1. *U.S. population.* The use of MAB does not pose a safety concern for the US human population due to the non-toxic nature of ABF (oral, dermal and acute exposure) and the absence of non-occupational exposure.

2. *Infants and children.* Infants and children are not exposed to MAB from its use in pesticide formulations or the treatment of potato seed pieces.

#### *F. International Tolerances*

No international tolerances have been established for ABF, wood flour or wood cellulose.

### **3. Wheelabrator Water Technologies, Inc.**

*PP 6E4732*

EPA has received a pesticide petition (PP 6E4732) from Wheelabrator Water Technologies, Inc., 8201 Eastern Boulevard, Baltimore, Maryland 21224, proposing pursuant to section 408(d) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. 346a(d), to amend 40 CFR part 180 to establish an exemption from the requirement of a tolerance for biosolids in or on the raw agricultural commodity Granulite. EPA has determined that the petition contains data or information regarding the elements set forth in section 408(d)(2) of the FFDCA; however, EPA has not fully evaluated the sufficiency of the submitted data at this time or whether the data supports granting of the petition. Additional data may be needed before EPA rules on the petition.

#### *A. Residue Chemistry*

1. *Residues in the raw agricultural commodity and processed food/feed.* A tolerance for substances potentially present in biosolids for raw or processed foods is not anticipated to be needed, based on the very low risk posed by residues in raw food/feed, as discussed throughout this application for a tolerance exemption for Granulite heat-dried biosolids.

2. *Background information and use profile.* Granulite is a heat-dried biosolids (sewage sludge) product. Biosolids are the solid, semi-solid, or liquid residue generated from domestic wastewater treatment, and have been used for centuries as a soil conditioner and fertilizer. Regulations regarding the use and disposal of biosolids have been introduced over the years to protect human health and the environment, culminating in the 40 CFR part 503 rule promulgated in 1992, which regulates biosolids based on a comprehensive risk assessment conducted by EPA. This rule has since undergone relatively minor revisions, including the deletion of chromium from the regulation; changes to the limits for molybdenum and selenium; and a narrowing of a focus of future biosolids rulemaking to dioxins/furans and polychlorinated biphenyls (PCBs). Land application of biosolids enhances soil conditions and plant growth on agricultural,

forest, reclaimed, and public use (e.g., recreational, highway) lands. Over 5 million dry metric tons of biosolids are generated annually in the U.S. at publicly owned treatment works. A minimum of 33% of the biosolids generated annually are land applied (this percentage has probably increased significantly in recent years), while the remaining are incinerated or disposed of using surface disposal. Of the biosolids that are land applied, an estimated 67% are applied to agricultural lands, 3% to forests, 9% to reclamation sites, and 9% to public use sites. Biosolids are land applied by either incorporating or injecting the biosolids into the soil or spreading the biosolids on the soil surface.

### *B. Toxicological Profile*

EPA has determined that the limits for inorganic pollutants (metals) calculated in the EPA biosolids risk assessment protect humans (including children), animals, and plants from reasonably anticipated adverse effects *via* the 14 different exposure pathways evaluated. The 40 CFR part 503 rule regulates metals based on these risk assessment limits, and regulates pathogens based on an operational standard requiring certain pathogen and vector controls that reduce pathogens to low levels (as described in "Safety Determination: U.S. General Population" below). For biosolids that meet the most stringent pollutant limits and pathogen controls of part 503, as Granulite does, only minimal additional part 503 requirements need to be met because of the low risk associated with these biosolids, which therefore are allowed to be used as freely as any other soil conditioner. Research indicates that risks associated with the bioavailability of metals in biosolids are low when biosolids are land applied at rates commonly used in agriculture and when good management practices commonly implemented (e.g., soil pH above 5.0) are followed.

1. *Acute toxicity.* EPA initially submitted a list of 200 pollutants potentially found in biosolids for review by a panel of experts; this panel recommended that 50 of these pollutants be studied further, based on available toxicity and exposure data. EPA then developed hazard for each of these 50 pollutants, derived by dividing a pollutant's estimated concentration in soil, plant or animal tissue, or air by the lowest concentration of the pollutants found in the scientific literature to be toxic to the organism being evaluated *via* the most sensitive route of exposure and assuming maximum toxic effect. A hazard index of less than 1 indicated that the pollutant was not toxic to the organism (*via* that particular exposure pathway), and thus was not analyzed further. EPA further evaluated pollutants with a hazard index value of 1 or greater in the biosolids risk assessment (except for pollutants deferred or deleted due to insufficient or limited data). EPA also evaluated several additional pollutants based on the addition of four exposure pathways. This process resulted in EPA evaluating 23 pollutants in its biosolids risk assessment for land application (see Table 1).

2. *Reproductive and developmental toxicity.* The ingestion of lead by children, which is associated with developmental effects (e.g., learning disabilities), was addressed by the EPA biosolids risk assessment in a conservative manner. EPA evaluated the risk to pica children (children who regularly eat soil) because it is possible that children might ingest soil to which biosolids have been land applied. However, only a small number of children are

likely to ingest biosolids in gardens or lawns, especially on a regular basis, and thus this evaluation is more conservative than dietary or drinking water exposures. In addition to lead, limits for arsenic, cadmium, mercury, and selenium are also included in the part 503 rule, based on a child ingesting biosolids that potentially contain these pollutants. Granulite meets all of these limits. For more details, see "Safety Determination: Infants and Children" below.

3. *Chronic toxicity.* EPA's risk assessment for the land application of biosolids included the evaluation of chronic effects based on RfDs or RfCs for metals and organic substances potentially found in biosolids. RDAs were used when RfDs were unavailable, or analogous no adverse effect levels were used. Acceptable doses of a substance were estimated for animals, using the most sensitive or most exposed species. The RfDs, RfCs, or analogous levels were combined with other variables to calculate the concentrations of pollutants in biosolids that are reasonably protective against adverse impacts. For the ingestion (dietary) pathways, RfDs were combined with a relative effectiveness RE variable. The RE of exposure accounts for differences in bioavailability depending on the route of exposure (e.g., ingestion or inhalation); because of limited available data, the RE was conservatively set at 1, which assumes 100% bioavailability intake, and thus underestimates the allowable dose of biosolids pollutants and reflects conservative pollutant limits. The pollutant concentrations calculated in the risk assessment were used to develop the most stringent limits in the 40 CFR part 503 rule, which Granulite meets.

4. *Carcinogenicity.* EPA's risk assessment for the land application of biosolids included evaluation of carcinogenicity based on q1\*s for metals and organic substances potentially found in biosolids. The q1\*s were used with other variables to calculate the concentrations of pollutants in biosolids that are reasonably protective against adverse impacts; these calculated concentrations were used to develop the most stringent pollutant limits in 40 CFR part 503 rule, which Granulite meets. EPA also conducted a population-based risk assessment which indicated that prior to the part 503 rule, biosolids use and disposal practices (including land application, incineration, and surface disposal) could have contributed 0.9 to 5 cancer cases annually; the part 503 rule reduced cancer cases by 0.09 to 0.7 annually. This analysis included exposure to pollutants potentially found in biosolids from all sources, including food, drinking water, residential, and other non-occupational sources.

5. *Endocrine disruption.* The EPA biosolids risk assessment considered all adverse effects identified in the scientific literature, including endocrine effects, if any, and used these to identify no observed adverse effect levels (NOAEL) for the pollutants evaluated. Future research may include additional impacts on wildlife due to limited available field data. Although not specific to endocrine effects, interactive (synergistic) effects observed with biosolids reduce (rather than increase) adverse risks to potential receptors. Interactions between certain elements typically found in biosolids hinder the uptake of metals by plants and the bioavailability of metals to animals and humans. See "Cumulative Risk" below for more information on these interactive effects.

### C. Aggregate Exposure

The 14 exposure pathways that EPA evaluated in its biosolids risk assessment included: children ingesting biosolids/soil directly (the pica child); adults ingesting plants grown in soils amended with biosolids or drinking ground-water or surface-water containing substances present in biosolids; adults ingesting fish from surface-water containing substances in biosolids; adults ingesting animal products derived from animals that ingested biosolids; animals ingesting biosolids or plants grown in biosolids-amended soils; and plants grown in biosolids-amended soils. Thus, the EPA risk assessment for the land application of biosolids addressed exposures from dietary, drinking water, and non-occupational sources. The most conservative estimate from the 14 exposure pathways was then selected as the limit for each of the pollutants potentially found in biosolids, thus representing protection based on aggregate exposure. Granulite meets these limits.

In addition, the EPA risk assessment calculations for all 14 pathways initially included pollutant exposure from sources other than biosolids (food, air, and water). Exposures from sources other than biosolids were then subtracted from the total allowable dose, yielding a result that represented the allowable dose of a pollutant from biosolids only. This value was then combined with other variables to derive a pollutant limit.

1. *Dietary exposure.* Parameters for human, animal, or plant health (e.g., based on RfDs, q1\*s, etc., as described above in "Chronic Effects" and ("Carcinogenicity")) were combined with pollutant intake information (e.g., the amount of a particular food type consumed) to derive pollutant limits in the EPA biosolids risk assessment. Several pollutant limits were based on a dietary exposure pathway (for the inorganic chemical molybdenum and for several organic chemicals). However, the limits for molybdenum were re-evaluated and new limits are expected to be less stringent, and limits for organics were not included in the part 503 rule, as discussed in "Other Considerations" below. For other pollutants, exposure pathways other than dietary exposure posed more risks, and pollutant limits were based on these higher-risk pathways.

2. *Drinking water.* The part 503 rule requires that biosolids be land applied at the agronomic rate (the rate that provides the amount of nitrogen needed by a crop or vegetation to attain a desired yield while minimizing the amount of nitrogen that will pass below the root zone of the crop or vegetation to ground-water), thus protecting ground-water from biosolids with nitrogen levels in excess of estimated crop needs. In addition, for ground-water, the EPA risk assessment analyzed the pathway involving: the land application of biosolids; the leaching (mobility) of pollutants from soil into ground-water; and the subsequent drinking of well water containing these pollutants by humans. The ground-water pathway evaluation included: a mass balance (between erosion, leaching, volatilization, and degradation persistence); a reference water concentration (based on the q1\* or MCL); and use of the VADOFT (from RUSTIC) and the AT123D models. For surface-water exposure, EPA analyzed the pathway involving: the land application of biosolids; the erosion (mobility) of soil containing pollutants in biosolids; the transfer of the pollutants contained in the eroded soil to surface-

water; and the ingestion of the surface-water and fish living in the surface-water by humans. The surface-water pathway evaluation included: a mass balance (as described above for ground-water); a reference intake (based on the  $q1^*$  or RfD); acute or chronic freshwater criteria for aquatic life; a bioconcentration factor; a food chain multiplier; and a dilution factor, among other parameters. No pollutant limit was based on the ground-water pathway because other exposure pathways resulted in more restrictive limits. Only one pollutant limit, for DDT/DDD/DDE, was based on the surface-water pathway; however, organics, including DDT, were deleted from part 503 regulation because they met at least one of three criteria set by EPA (see "Other Considerations" below).

While metals potentially present in biosolids may be persistent, they are bound in the biosolids-soil matrix for long periods of time, as discussed in "Environmental Fate Data Summary" below. Also, the dry characteristics of Granulite, which is heat-dried, minimize water content and leachability of metals.

3. *Non-dietary exposure.* EPA's biosolids risk assessment evaluated exposure to pollutants potentially found in biosolids that are land applied to gardens, lawns, and other residential and non-occupational settings in non-dietary pathways.

#### *D. Cumulative Effects*

Extensive field data used in EPA's risk assessment for biosolids show no adverse effects of low levels of metals in land-applied biosolids. Some metals are not transferred into edible plant parts (even when their concentrations are greatly increased in the biosolids/soil mixture) because these metals (e.g., chromium) are insoluble or strongly bound to the biosolids-soil matrix (by iron or certain other oxides, organic matter, or phosphates in biosolids) or to plant roots (e.g., lead). Or, if other substances commonly found in biosolids, such as zinc, calcium, and iron, are present, these substances will inhibit absorption of some metals (e.g., selenium, molybdenum, and cadmium) from the ingested food into the organism's intestines and blood stream. Also, the EPA biosolids risk assessment included bioavailability and bioaccumulation factors to account for uptake of pollutants by animals (e.g., fish) and subsequently by humans.

#### *E. Safety Determination*

1. *U.S. population.* The EPA biosolids risk assessment as well as field data show that certain biosolids that meet low pollutant limits for metals can be considered NOAEL biosolids that have no observed adverse effects on public health and the environment. Granulite meets these limits. Human and animal health protection from pathogens are addressed in the part 503 regulation through technology-based requirements that minimize pathogen densities and reduce vector attraction. Granulite meets the most stringent "Class A" part 503 requirements that pathogen densities be reduced to low levels.

2. *Infants and children.* For several of the metals evaluated in EPA's biosolids risk assessment, the pollutant limit identified was based on the exposure pathway for a pica child ingesting biosolids/soil. These limits are conservative because they go beyond expected dietary and drinking water exposures (i.e., a very small percentage of children are expected to consume biosolids in gardens

or on lawns). Also, the limit for lead in biosolids in the part 503 regulation is 300 ppm, based on animal data. This number provides an additional margin of safety for growing children because it is lower than the 500 ppm limit for lead derived using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) model. In addition, animal (rat) studies show that the bioavailability of lead in biosolids is 12-fold lower than that assumed in the IEUBK model calculations used; thus the 300 ppm lead limit provides even more of a margin of safety. The limits identified for the other metals (arsenic, cadmium, mercury, and selenium) based on a child ingesting biosolids/soil were calculated in algorithms developed specifically for the EPA biosolids risk assessment. The most stringent part 503 pollutant limits for metals in biosolids that are land applied are based on these figures; Granulite meets these limits.

#### *F. Other Considerations*

Organic chemicals were evaluated in the EPA biosolids risk assessment. However, the part 503 rule did not set limits for organic chemicals because all the organic chemicals analyzed met one or more of the following criteria:

- i. The pollutant has been banned or restricted for use in the U.S. or is no longer manufactured in the U.S.
- ii. The pollutant is infrequently found in biosolids (e.g., detected less than 5% of the time).
- iii. The limit for the pollutant identified in the EPA biosolids risk assessment is not expected to be exceeded in biosolids that are used or disposed.
- iv. Nearly all of the organic chemicals evaluated met two or more of these criteria.

#### *G. Practical Analytical Method*

Numerous analytical methods were used in the hundreds of research studies on which the EPA risk assessment for the land application of biosolids was based. Examples of analytical methods used for analyzing metals concentrations in plant and animal tissue include atomic absorption, X-ray fluorescence spectroscopy, and autoradiography.

#### *H. List of All Pending Tolerances and Exemptions*

The only known exemption from tolerance being proposed for biosolids as an inert ingredient is this application, which is based on the health and environmental protection identified in EPA's part 503 risk assessment for the land application of biosolids, as discussed throughout this application.

#### *I. Environmental Fate Data Summary*

Studies have shown that metals are bound in the biosolids-soil matrix over the long-term and that the binding properties of biosolids are environmentally stable. The binding of metals by biosolids renders the metals less bioavailable to plants, animals, and humans, and studies have shown no adverse effects when biosolids containing metals meeting the part 503 pollutant limits, which includes Granulite, are land applied.

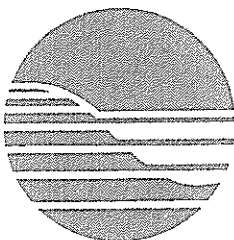
The EPA risk assessment for the land application of biosolids included analysis of ecological risks through ground-water, surface-water, plants, livestock, and wildlife (as well as to humans, including children). Low risks were found to be associated with the ground-water pathway and to wildlife, and thus pollutant limits for chemicals of concern for these pathways or endpoints were based on other, more restrictive risk assessment limits for other pathways/endpoints. Granulite meets all of these limits. The one organic pollutant of concern identified for the surface-water pathway was deleted from regulation, as discussed in "Other Considerations" above.

*J. International Tolerances*

None known. Compatibility with any existing MRLs should be possible, based on the low risk of adverse effects identified in EPA's risk assessment for the land application of biosolids. (Bipin Gandhi)

[FR Doc. 98-????? Filed ??-??-98; 8:45 am]

**BILLING CODE 6560-50-F**



COMPLIANCE SERVICES INTERNATIONAL

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2001 Jefferson Davis Highway Suite 1010  
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March 19, 1998

Dr. Indira Gairola  
Minor Use, Inerts & Emergency Response Branch  
Registration Division  
Office of Pesticide Programs  
Environmental Protection Agency  
1921 Jefferson Davis Highway  
Arlington, VA 22202

RE: Modal Alder Bark (alder bark flour)  
Request for Classification as inert ingredient (List 4A)  
And Tolerance Exemption Petition

Dear Indira:

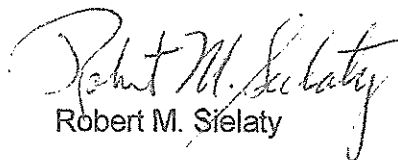
As discussed with you and Kerry, we are submitting, on behalf of Platte Chemical Company, the enclosed copy of the "Template for Company Notice of Filings for Pesticide Petitions" in both printed form and in a floppy disc in WordPerfect 6.0/95 format. We trust that the information can be published in the Federal Register soon.

As stated in the Notice, we are requesting that Modal Alder Bark (alder bark flour): (1) be classified as a pesticidal inert ingredient on List 4A - Inerts of Minimal concern; and (2) be exempt from the requirement of a tolerance for residues in growing crops and raw agricultural commodities.

The request and the petition and supporting data were submitted and received by the Agency by letters dated June 12, 1996 and August 15, 1997.

If there are any questions, please contact me immediately. Thank you.

Very truly yours,

  
Robert M. Sielaty

Cc: A. Dunlap  
S. Hathorn

Headquarters: 1112 Alexander Avenue  
Tacoma, Washington 98421-4102  
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Washington D.C. Office: 2001 Jefferson Davis Hwy., Suite 1010  
Arlington, Virginia 22202-3603  
Phone: (703) 415-4600  
Fax: (703) 415-1767

## Template for Company Notice of Filings for Pesticide Petitions

(Dated: 1/1/98)

EPA Registration Division contact: [insert name and telephone number]

[INSTRUCTIONS: Please utilize this outline in preparing tolerance petition submissions. In cases where the outline element does not apply please insert "NA-Remove" and maintain the outline. The comment notes that appear on the left margin represent hidden typesetting codes designed to expedite the processing of the FEDERAL REGISTER document. Please do not remove or alter these codes or change the margins in your submission. Simply type the information requested starting after the heading.

### 1. Platte Chemical Company

PP 6E4742

EPA has received a pesticide petition (PP 6E4742) from Platte Chemical Company, 419 18<sup>th</sup> Street, P.O. Box 667, Greeley, CO 80632, proposing pursuant to section 408(d) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. 346a(d), to amend 40 CFR Part 180 to classify Modal Alder Bark (alder bark flour) as an "Inert of Minimal Concern" (List 4A), and to establish an exemption from the requirement of a tolerance for residues of the inert ingredient Modal Alder Bark (alder bark flour) when used in pesticide formulations applied to growing crops, or in or on raw agricultural commodities after harvest. EPA has determined that the petition contains data or information regarding the elements set forth in section 408(d)(2) of the FFDCA; however, EPA has not fully evaluated the sufficiency of the submitted data at this time or whether the data supports granting of the petition. Additional data may be needed before EPA rules on the petition.

### A. Residue Chemistry

1. *Plant metabolism.* Modal Alder Bark is not absorbed or metabolized by plants. The alder bark flour remains on the treated surface, where it decomposes to its natural constituents including, cellulose, hemicelluloses, lignin and various compounds such as suberins and phenolic acids. These decomposition products are further degraded by various bacteria and fungi to simple sugars, carbohydrates, gases and other molecular compounds. Eventually alder bark flour will be completely decomposed by natural processes to nutrients which can be utilized by other plants.

2. *Analytical method.* No analytical method is available for determining Modal Alder Bark, *per se*. Although various methods are available to determine the various components of alder bark (e.g., content of cellulose, lignin, polysaccharides, etc.), these methods are not specific to Modal Alder Bark and can not distinguish whether the components are derived from alder bark flour or from other plant or soil sources.

3. *Magnitude of residues.* Since alder bark flour is not absorbed or metabolized by plants, no residues of Modal Alder Bark are expected to result in or on raw agricultural commodities. For example, potato commodities grown from seed potato pieces treated with formulations containing modal alder bark do not have residues of the inert ingredient. Furthermore, any residues would be associated with the potato seed pieces, which shrivel as the daughter plants withdraw nutrients during "seedling" growth. Consequently, the spent seed pieces are not harvested and will not be eaten. Finally, any Modal Alder Bark adhering to the harvested potatoes would be removed by brushing and washing.

#### *B. Toxicological Profile*

1. *Acute toxicity.* The use of Modal Alder Bark (alder bark flour) as an inert ingredient in pesticide formulations is not expected to result in adverse effects due to its non-hazardous character, minimal potential for exposure, and projected absence of dietary exposure. There is a wealth of available information about the absence of, or minor health effects from, exposure to various wood flours, dusts, shavings, and other wood/bark components. Ingestion of wood flour, sawdust or wood shavings is neither lethal, nor toxic, and is even considered to be a source of non-nutritive dietary fiber. Dermal contact with wood or bark flour is not associated with death or toxicity, although dermal allergies (contact dermatitis) have been reported in certain sensitive individuals. Acute inhalation exposure to wood dusts for a limited time is not considered to be an occupational hazard if dust levels are below established Permissible Exposure Levels (PEL) for non-toxic particulate matter (i.e., unspecified dust particles). Modal Alder Bark is not expected to produce any more eye irritation than any chemically inert particulate, such as clay or wheat flour. In persons who may have a specific alder wood allergy, eye irritation or conjunctivitis is possible even though there are no known reports of such incidences. Alder wood dust is not a sensitizer nor is alder bark flour expected to be a sensitizer.

2. *Genotoxicity.* Evidence from studies with wood-related compounds indicate that Modal Alder Bark is not genotoxic. Alder bark flour is composed mostly of cellulose, hemicelluloses and lignins, which are not mutagenic.

3. *Reproductive and developmental toxicity.* Modal Alder Bark is not expected to be a developmental or reproductive toxin, based on extensive testing of the three principle components (cellulose, hemicelluloses and lignins) of alder bark flour. Additionally, wood flours have been used for numerous years to increase dietary fiber in animal feeds and human diets with no known adverse reproductive or developmental toxicity.

4. *Subchronic toxicity.* There is no subchronic exposure to Modal Alder Bark from its use as a pesticidally inert ingredient. However, chronic toxicity data adequately address possible toxicological effects that may result from subchronic exposure to alder bark flour.

5. *Chronic toxicity.* There is minimal-to-no chronic toxicological risk from the use of Modal Alder Bark as an inert ingredient in pesticide formulations. There are no known adverse reactions to chronic consumption or ingestion of wood flour. Ingestion of wood flour, sawdust

or wood shavings for extended periods of time is not hazardous. Instead, it is considered to be a non-nutritive dietary supplement. In fact, the Food and Drug Administration (FDA) has allowed the use of wood flours in various prepared foods, such as bread, to increase dietary fiber levels and reduce caloric intake.

Adverse effects of exposure to wood dust are limited to allergic reactions, such as rhinitis and contact dermatitis, and from chronic (lifetime) occupational exposure (via inhalation) to high concentrations of wood dust. Based on the absence of chronic effects from ingestion, the limited irritant and allergic effects from dermal contact, limited exposure to alder bark flour from seed potato treatment, and the absence of chronic exposure by any route, Platte Chemical Company concludes that there is minimal-to-no chronic toxicological risk from the use of Modal Alder Bark in pesticide products.

6. *Animal metabolism.* There is no known human metabolism or metabolic products from human ingestion of non-nutritive dietary fiber from wood products. In humans, the polymers of plants such as cellulose from plant cell walls ( $\beta$  linkages), some pectins, hemicellulose, gums, mucilages and lignin, are not easily digested and are passed through the gastrointestinal tract as non-nutritive dietary fiber. Wood flour and sawdust are commonly used in animal feeds. In ruminants, such wood products are reduced to cellulose, hemicelluloses and lignins by endogenous bacterial/microbial populations in the gut. These wood product degradates are further reduced to simple sugars, carbohydrates, carbon dioxide and indigestible biomass. The indigestible biomass is readily excreted.

7. *Metabolite toxicology.* There is no known evidence of metabolite toxicity from the ingestion of wood or alder bark flour by either livestock or humans. In humans, no metabolites are produced after ingestion of non-nutritive dietary fiber such as alder bark flour.

8. *Endocrine disruption.* No endocrine or estrogenic effects are expected from the use of Modal Alder Bark for the following reasons: 1) the production of Modal Alder Bark includes oven drying the bark, which removes moisture and volatile organic compounds; 2) alder bark flour does not penetrate and will not be absorbed by skin; 3) alder bark is primarily composed of naturally-occurring, non-digestible cellulose, hemicelluloses and lignin; and most importantly, 4) there is no non-occupational exposure to Modal Alder Bark when used as a pesticidally inert ingredient.

### C. Aggregate Exposure

1. *Dietary exposure.* Ingestion of Modal Alder Bark or its residues would simply increase the level of non-nutritive fiber in the diet, which has been shown to have beneficial health effects by reducing the incidence of diverticulosis, cancer of the colon and coronary heart disease as well as facilitating weight loss. Also, health claims for fiber-containing foods have been made for more than a century and the effects of fiber in promoting bowel evacuation are widely recognized.

2. *Food.* The use of Modal Alder Bark in potato seed piece pesticides does not result in any significant dietary exposure to alder bark flour. Residues, if any, surround the potato seed pieces, which shrivel as the daughter plants withdraw nutrients during "seedling" growth. Consequentially, the spent seed pieces are not harvested and will not be eaten. Brushing and washing potatoes to remove particulates, such as soil, would simultaneously remove any residues of Modal Alder Bark. However, should alder bark flour residues adhere to harvested potatoes, the only effect would be to increase the level of non-nutritive dietary fiber. Were this to be the case, ingestion of Modal Alder Bark residues would be beneficial and of no toxicological concern since Modal Alder Bark can be considered to be a non-nutritive source of dietary fiber, which has been shown to improve health and lessen the incidence of diverticulosis, colon cancer and coronary heart disease.

3. *Drinking water.* The use of Modal Alder Bark as an inert ingredient in pesticide formulations does not lead to alder bark particles in the drinking water. Wood and bark particles do not leach into the ground water. Any particles that may be transported into water bodies will absorb moisture and either sediment out of the water column or be removed with other particulate matter during drinking water treatment. Similarly, any natural water-extractable components (humic acids, fulvic acids, etc.) of Modal Alder Bark are natural products that will also be removed during drinking water treatment.

4. *Non-dietary exposure.* The only anticipated human exposure to Modal Alder Bark from non-dietary sources would be through occupational exposure during product use.

*D. Cumulative Effects.* The use of Modal Alder Bark as an inert ingredient in pesticide formulations does not result in any cumulative effects, since there is no non-occupational exposure to Modal Alder Bark.

#### *E. Safety Determination*

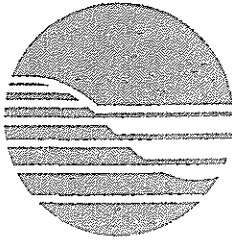
1. *U.S. population.* The use of Modal Alder Bark does not pose a safety concern for the US human population due to the non-toxic nature of alder bark flour (oral, dermal and acute exposure) and the absence of non-occupational exposure.

2. *Infants and children.* Infants and children are not exposed to Modal Alder Bark from its use in pesticide formulations or the treatment of potato seed pieces.

*F. International Tolerances.* No international tolerances have been established for alder bark flour, wood flour or wood cellulose.

6E4742

RECD EPA/OPP/DPD1



## COMPLIANCE SERVICES INTERNATIONAL

Washington, D.C. Area Office:  
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Arlington, Virginia 22202-3603

Phone: (703) 415-4600  
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June 12, 1996

Mr. Kerry B. Leifer  
Project Coordination Section  
Registration Support Branch (7505W)  
Office of Pesticide Programs  
2805 Jefferson Davis Highway  
Arlington, VA 22202

Re: Modal Alder Bark

Dear Kerry:

On behalf of Platte Chemical Company, we request that EPA approve Modal Alder Bark on List 4A as a "generally recognized as safe" inert ingredient to be used in potato seed treatment fungicide formulations. In support thereof, we are submitting the following:

1. Modal Alder Bark is the trade name by Ace International, Inc. of Centralia, Washington for bark flour produced from cured and dried bark stripped from Alder tree logs in the Southwestern Washington area. It is composed of finely ground amorphous hardwood cellulose fibers and cork tissue, which has undergone a long curing process to remove excess moisture. (A full description of the manufacturing process in attached.)

2. Alder Bark helps to dry surface moisture of cut potato seed, adheres well to the cut surface, and stimulates germination. It is also used as extenders and fillers for paints, oil well drilling muds, glue, fiber cartons and other products. Large quantities are shipped to Australia and Japan.

3. Alder bark is composed mainly of cellulose, a natural product, which is already listed as a List 4A - Inert of Minimal Concern. There are no additives. Because the product is a dust, there are minimal hazards which can be avoided with proper handling. (See Material Safety Data Sheet attached.)

4. Fungicide formulations for potato seed treatment contain a mixture of active ingredient, diluent and comminuted Alder bark. The composition varies according to the degree of drying desired, but products generally contain a range of 25 to 30% by weight of alder bark. The concentration can go as low as 5 - 10%, or as high as 40%, but coverage and effectiveness are factors. (See U.S. Patent document dated June 18, 1991 attached.)

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RECD EPA/OPP/DPD1

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CSI Letter of June 12, 1996  
Page 2

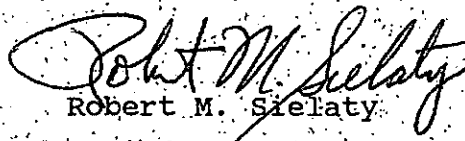
5. Alder bark has similar characteristics as Douglas fir bark, which is also a bark flour used as an inert, and is listed as an List 4A - Inert of Minimal Concern. However, Douglas fir bark contains slivery lignin fibers which have been shown to be more irritating than cellulose because they float in the air and cause irritation to workers around treating equipment. Alder bark contains only cellulose fibers which are non-irritating. (See letter dated January 28, 1993 from Snake River Chemicals, Inc. attached.)

6. A review of List 4A - Inerts of Minimal Concern shows that there are other woody/fibrous inerts similar to Alder bark, e.g. almond hulls, cardboard, coco shell flour, corn cobs, cotton, peanut shells, pecan shell flour, rice hulls, sawdust and walnut shells. Because the characteristics of these materials are the same, the Agency should treat Alder bark in the same manner as these other approved inerts.

Based on the above, Modal Alder bark should be listed as an List 4A - Inert of Minimal Concern. Further information can be make available, if necessary, but we believe that the similarities to Douglas fir bark and other inerts, which are already on List 4A, as well as the less irritating quality of Alder bark flour, are sufficient reasons to grant approval.

If there are any questions or need for information, please call me at (703) 415-4600. Thank you.

Very truly yours,

  
Robert M. Sielaty

cc: Allen Dunlap, United Ag Products

1-9-92

#### SUMMARY REPORT

TELEPHONE DISCUSSION: John Herschelman. Menasha Corp. Eugene, OR.  
Phone 1-800-444-2037

SUBJECT: Manufacturing process for Modal brand Alder Bark.

On January 6, 1992 I contacted Mr. John Herschelman by phone to cover details of the manufacturing process for Modal alder bark. All aspects of the process such as regrinding and multiple screening are not covered here for the sake of brevity, however all specific steps of the process is covered.

The raw product is purchased from several Alder tree logging companies in the Southwestern Washington area. The bark is stripped from the logs by a router device that also reduces the bark to acceptable processing size. The material is stored for a period of four to five weeks on concrete ramps where the material is aged to obtain proper color. After aging is completed it is taken into a feed bin and screening process where all the "white" wood, rock and metal particles are removed. The material then goes to a hammer mill for particle size reduction and additional cleaning of foreign material. After milling and cleaning the product goes through the drying operation.

The dryer is a thirty foot long cylinder, eight feet in diameter. It takes three to five minutes for the product to move through this process and obtain a dry down to five percent moisture content required. The exhaust air temperature from the drying drum varies from 165 F. - 200 F. Internal temperatures is probably 200 to 250 F. degrees plus. The gas fired dryer burns twelve pounds of fuel per minute. Temperature control is critical since too high a temperature creates a fire hazard. Travel time through the drying drum depends on the moisture content of the Alder bark being processed. Since this is all fresh bark with limited drying in the short aging process it must be assumed that moisture content could be as high as twenty percent. From the drying operation the product goes through particle size selection, air removal for bagging and final packaging and shipment.

A substantial amount of Alder bark is used in potato seed treat fungicide dust formulations. Growers using the product have experienced decay problems in cut potato seed that was cut, treated and stored in cellars without temperature or humidity control and inadequate ventilation.

(2)

One local potato research pathologists has indicated contamination could possibly come from bark formulations as he has isolated bacterial and fungal organisms from alder bark. It has never been demonstrated that these isolates are pathogenic to potato tubers. Tests will be undertaken to determine if these assumptions are valid. I have consulted several local potato pathologists and it is there opinion that it is highly unlikely bacteria and fungal organisms could survive the moist heat of 250 degree drying temperature during the three to five minute exposure as viable micro flora. Modal has nutritive plant value. It is possible, but not probable, that disease producing bacteria and fungi could feed and proliferate on the nutrients in the bark formulation after it was applied to disease infected tubers. This could possibly occur under high moisture and temperature conditions.

It is of interest that large quantities of Modal is shipped to Australia and Japan. Modal has many uses as extenders and fillers. It is used extensively in the manufacture of paints, oil well drilling muds, fiber carton production, and extenders for glue in wood processing industries, to name a few. Modal, being of plant origin, is subject to examination for potential disease causing organisms by the plant quarantine services of the importing countries. To my knowledge none have been found.

Chuck Chollet  
Snake River Chemicals  
P.O. Box 1196  
Caldwell, Idaho 83606

8-4-92

Mr. Dale Foust. Mgr.  
Menasha Corporation  
Wood Fiber Division -  
1830 Central Blvd.  
Box 885- Centralia, WA 98531  
Phone 206-736-3937

Addendum report to 1-9-92 on Menasha Corp. in the manufacturing of Modal brand Alder Bark.

I met with Dale Foust. Mgr. of the manufacturing facility in Centralia, WA on the morning of June 25th. I wanted to reaffirm the process of making Modal alder bark product.

The Alder bark, after undergoing a curing process from four to six weeks, enters the plant through a feed bin and has not yet been ground. Except for loading from yard piles to the feed bin the operation is essentially a computerized process from beginning to end. At this time the Alder bark will contain from 20 to 50 percent moisture. From the feed bin it is a continuous process through the grinding, sorting, drying, regrinding and packaging operation. The raw product goes from the feed bin to the Rotex grinders, reducing the raw product to inch size chunks. Next, the hammermill further reduces the product to shreds before going over the sorter or Soderham. In the Soderham the white wood, foreign matter such as metal particles, rocks, etc. is removed prior to entering the drier.

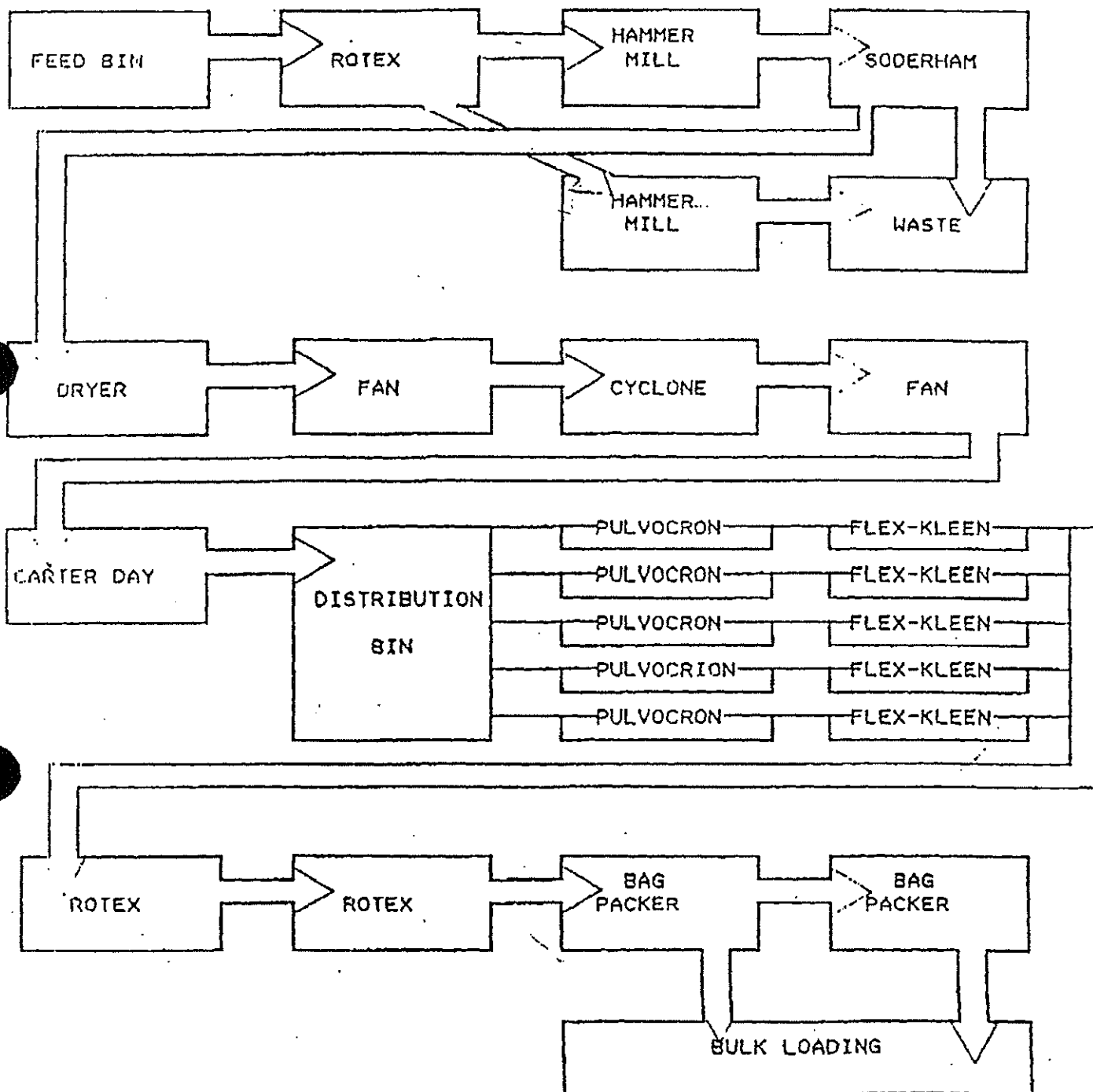
The drier is a drum approximately thirty feet long and eight feet in diameter. It has a porous outside covering to allow air to escape but not the ground bark. The heat for drying is supplied by a two inch propane jet that boosts the temperature to 1300 to 1500 degrees F. The bark, through a series of baffles, moves through the drier three times prior to exiting in a period of five to seven minutes. At the exit the temperatures are in excess of 250 F. There is a continuous air sorting process which may return some of the bark to grinders, hammermills and pulverizers to attain proper particle size. Product goes to bulk bins for bagging, palletizing, shrink wrapping and shipment.

Fire box Temperature  
not cylinder drying  
Temperature - 1400

The process I found the most intriguing was the intense heat the bark undergoes in the drier. Essentially it is a live steam or highly elevated steam process where few, if any, biological organisms could survive. This has been substantially documented by tests conducted by Drs. Phillip Nolte and Gary Secor. Their biological evaluations have shown no potato disease producing or pathological organisms exist in Modal brand alder bark under standard acceptable laboratory testing procedures.

End of report.

Chuck Chollet



CENTRALIA PLANT

Current MSDS  
3/1/95**MATERIAL SAFETY DATA SHEET**

REVISION DATE: 03/01/95

**Section 1. IDENTIFICATION** (Bark Flour, Wood Flour) **TRADE NAME:** Modal, Superbond, T-Series, A-Series, M-Series, and B-Series products. **Description:** Particles generated by mechanical cutting or abrasion process performed on wood or bark. **Manufacturers Name:** Ace International Inc., P.O. Box 885, Centralia, WA 98531 Telephone: (360) 736-9999.

**Section 2. HAZARDOUS INGREDIENTS**

WOOD or BARK Dust/ Wood Particles: SEQ-34-4

Applicable Exposure Limits	Applicable Exposure Limits	Applicable Exposure Limits
<b>W.I.S.H.A.</b> PEL-W.I.S.H.A. Non-allergenic wood dust 5mg/m <sup>3</sup>	<b>O.S.H.A.</b> PEL-O.S.H.S.A. Hardwood 5mg/m <sup>3</sup> Softwood 5mg/m <sup>3</sup> STEL 10mg/m <sup>3</sup>	<b>ACGIH</b> TLV-Biological Exposure Index Hardwood 1mg/m <sup>3</sup> Softwood 5mg/m <sup>3</sup> STEL 10mg/m <sup>3</sup>

**Section 3. PHYSICAL PROPERTIES**

**BOILING POINT:** None; **SPECIFIC GRAVITY:** (water = 1); <1; **VAPOR PRESSURE:** None; **PERCENT VOLATILE:** None; **MELTING POINT:** None; **SOLUBILITY IN WATER:** Insoluble; **EVAPORATION RATE:** None; **PH:** None; **APPEARANCE AND ODOR:** Color and odor are variable dependent upon species and time between harvesting and processing.

**Section 4. FIRE AND EXPLOSION DATA**

**FLASH POINT:** None; **AUTO-IGNITION TEMPERATURE:** Variable (typically 400-500 Degrees F); **EXPLOSIVE LIMITS IN AIR:** 40 grams/m<sup>3</sup> (LEL); **EXTINGUISHING MEDIA:** Water, Carbon Dioxide, Halon, Dry Chemical, Sand, Foam. **SPECIAL FIRE FIGHTING PROCEDURES:** Use water mist to wet down wood or bark dust to reduce the likelihood of ignition or dispersion of dust into air. Remove burned or wet dust to open area after fire is extinguished. **UNUSUAL FIRE AND EXPLOSION HAZARD:** Wood or bark dust may present a strong to serve explosion hazard if dust cloud contacts an ignition source.

**Section 5. HEALTH HAZARD INFORMATION**

**SIGNS AND SYMPTOMS OF EXPOSURE:** Exposure to wood or bark dust can produce allergic reaction in sensitive individuals. Allergic responses include dermatitis as a result of skin contact and respiratory irritation, nasal dryness, coughing, wheezing, sneezing, or breathing difficulties as a result of inhalation. **MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Respiratory condition and allergies. Sinusitis and prolonged colds have also been reported. **CHRONIC EFFECTS:** Wood or bark dust, depending on species, may cause dermatitis on prolonged, repetitive contact; may cause respiratory sensitization and/or irritation. Prolonged exposure to wood or bark dust has been reported by some observers to be associated with nasal cancer. Wood or bark dust is not listed as a carcinogen by IARC, ACGIH, NPT, or OSHA. **EMERGENCY FIRST AID PROCEDURES:** **EYES:** Flush with water to remove dust particles. If irritation persists get medical attention. **SKIN:** Seek medical attention if a rash, dermatitis or other skin disorders occur. **INGESTION:** None; **INHALATION:** Remove to fresh air. If irritation or other symptoms persist, consult a physician.

**Section 6. REACTIVITY DATA**

**Stability:** Stable under normal conditions. **INCOMPATIBILITY:** Avoid strong oxidizing agents and drying oils. **HAZARDOUS COMPOSITION PRODUCTS:** Thermal-oxidative degradation of wood or bark produces irritating and toxic fumes and gases, including CO, aldehydes and organic acids. **HAZARDOUS POLYMERIZATION:** Will not occur. **INGESTION:** None; **CONDITIONS TO AVOID:** Wood or bark dust is extremely combustible. Keep away from ignition sources.

**Section 7. SPILL-LEAK PROCEDURES**

**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:** Sweep or vacuum up spills for recovery disposal. Avoid creating dust conditions. Do not use compressed air. Provide for good ventilation. Place recovered wood or bark dust in a container for proper disposal. **WASTE DISPOSAL METHOD:** Dispose in a landfill or incinerator in accordance with local, state, and federal regulations.

**Section 8. SPECIAL PROTECTION INFORMATION**

**PERSONAL PROTECTIVE EQUIPMENT:** Wear goggles or safety glasses and other protective equipment such as gloves and NIOSH approve breathing protection for exposure to wood or bark dust. Respirators are required if air contaminations exceed ACGIH TVL. **VENTILATION:** Provide adequate general and exhaust ventilation to maintain healthful working conditions. Due to explosive potential of wood or bark dust when suspended in air, precautions should be taken to prevent sparks or other ignition sources in ventilation equipment.

**DISCLAIMER:** Ace International Inc. believes the information contained in this MSDS to be accurate at the time of preparation and has been compiled using sources believed to be reliable. However, Ace International Inc. makes no warranty, either expressed or implied, concerning the accuracy or completeness of the information presented. It is the responsibility of the user to comply with local, state and federal regulations concerning use of this product. It is further the responsibility of the buyer to research and understand safe methods of storing, handling, and disposal of this product.

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**United States Patent** [19]  
**Chollet**

[11] Patent Number: **5,024,690**  
[45] Date of Patent: **Jun. 18, 1991**

- [54] SEED TREATMENT COMPOSITIONS  
[75] Inventor: Charles C. Chollet, Caldwell, Id.  
[73] Assignee: Snake River Chemicals, Inc.,  
Caldwell, Id.  
[21] Appl. No.: 437,276  
[22] Filed: Nov. 15, 1989

**Related U.S. Application Data**

- [60] Division of Ser. No. 290,236, Dec. 22, 1988, which is a continuation-in-part of Ser. No. 859,240, May 7, 1986, abandoned, which is a continuation of Ser. No. 696,443, Jan. 30, 1985, abandoned.  
[51] Int. Cl.<sup>3</sup> ..... A01N 25/00; C05F 11/00  
[52] U.S. Cl. .... 71/77; 71/23  
[58] Field of Search ..... 71/77, 23, 24

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

2,314,091	3/1943	Jones	71/77
2,782,241	2/1957	Gray et al.	568/716
2,838,877	6/1958	Working	47/58
2,845,450	7/1958	Anderson et al.	560/268
2,909,869	10/1959	Dresser	71/1
3,370,957	2/1968	Wagner et al.	514/365
3,561,943	2/1971	Gay et al.	71/9
3,607,211	9/1971	Cole et al.	71/1
3,645,714	2/1972	Heming et al.	71/23
3,813,236	5/1974	Allan	71/79
3,867,324	2/1975	Clendinning et al.	523/126
3,901,838	8/1975	Clendinning et al.	523/126

3,940,257	2/1976	Sherwin et al.	71/23
3,966,708	6/1976	Casebier et al.	71/23
3,970,691	7/1976	Sears et al.	562/32
4,067,716	1/1978	Sterrett	71/24
4,145,206	3/1979	Ford	71/23

**FOREIGN PATENT DOCUMENTS**

2432432	1/1975	Fed. Rep. of Germany	71/23
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**OTHER PUBLICATIONS**

Hartley et al., *The Agrochemicals Handbook*, A391, (The Royal Soc. Chem., 1983).  
Secor et al., *Valley Potato Grower*, pp. 27-28, (Nov. 1987).  
Chollet, *Potato Grower of Idaho*, pp. 42-43, (Jan. 1985).  
*Primary Examiner*—Richard L. Raymond  
*Assistant Examiner*—Brian Bembenick  
*Attorney, Agent, or Firm*—William Brinks Olds Hofer Gilson & Lione

[57] **ABSTRACT**

Methods of using comminuted Alder bark as a stimulator of seed germination and growth media comprising comminuted Alder bark are disclosed. Also disclosed are seed treatment dusts comprising an active ingredient, a diluent material and comminuted Alder bark and methods of using these dusts. The active ingredients include fungicides, insecticides and other pesticides. The diluent materials used include clays and talcs.

**6 Claims, No Drawings**

## SEED TREATMENT COMPOSITIONS

This is a division of application Ser. No. 07/290,236, filed Dec. 22, 1988, which is a continuation-in-part of Applicant's pending application Ser. No. 06/859,240, filed May 7, 1986, now abandoned which was a continuation of application Ser. No. 06/696,443, filed Jan. 30, 1985, now abandoned.

## BACKGROUND OF THE INVENTION

It has long been known that the dusting of seeds prior to planting with seed treatment dusts composed of an active ingredient and one or more diluent materials would improve crop yields. The active ingredients commonly used include fungicides, insecticides, and other pesticides. The diluent materials used include clays, talcs and comminuted Douglas Fir bark.

The active ingredient of the seed treatment dust protects the newly planted seed and its developing root system from attacks by harmful organisms found in the soil during the germination period. The germination period is critical because the events that occur during this period determine, to a great extent, the health and productivity of the plant that grows from the seed. The longer a seed remains in the ground before it germinates, the more vulnerable it becomes to attack by fungi and by other soil-borne pathogens and insects. A seed attacked by soil-borne organisms is less likely to produce a healthy plant. Indeed, such a seed may not produce a plant at all.

If, however, a seed germinates quickly and is protected from attack by soil-borne organisms during the germination period, there is much less chance that the plant will become diseased or will die if it does become diseased. Since the active ingredients used in seed treatment dusts protect the seed from attack by soil-borne organisms, seeds dusted with dusts containing an active ingredient have an increased chance of producing a healthy, productive plant.

The diluent materials used in seed treatment dusts act to dry seeds. Wet seeds are susceptible to attack by bacteria while they are stored awaiting planting, and a bacterial infection may weaken the seed. A weakened seed will, in turn, produce an unhealthy plant or will not produce a plant at all.

The combination of the drying effect of the diluent materials and the fungicidal or other activity of the active ingredient protects the seed during the period prior to planting and during the germination period. Seeds thus protected are much more likely to produce high crop yields.

Seeds which are dusted include the seeds of grains, legumes, onions, tubers and flowers. In particular, the dusting of tuber seeds such as potato seeds is very desirable for the production of good crops.

Potato seeds are prepared for planting by cutting a potato into several parts. The potato seed pieces are then loaded into trucks or bags and stored until planting.

When the potato is cut, the cut sides of the potato are moist. The potato secretes a substance called suberin which begins to heal the cut surface of the potato in six to eight hours if the potato surface can dry during this time. Since the potato seed pieces are piled into bags or trucks after cutting, they would, under these circumstances, remain wet for an extended period of time. These wet conditions promote bacterial growth. Fur-

ther, since the suberin cannot heal the cut surface of the potato while it is wet, the bacteria can more easily gain access to the potato seed and start to decay the seeds. Seeds thus attacked by bacteria may be weakened before they are planted. Potato seeds and their newly developing root systems are ordinarily susceptible to insects, to fungi and to other soil-borne pathogens, but a weakened seed is particularly susceptible to these harmful organisms.

If the potato seeds are dusted immediately after they are cut, the diluent materials dry the potato seeds thereby allowing the suberin to heal the cut surfaces of the potato seeds and removing an environment conducive to bacterial growth. The dusted seeds are, consequently, less likely to be weakened by bacterial decay before being planted. Further, the active ingredient in the seed treatment dust will protect the potato from attack by harmful soil-borne organisms after planting.

As mentioned above, one of the diluent materials in use is comminuted Douglas Fir bark. Comminuted Douglas Fir bark is an excellent diluent material since it is a very effective drying agent. One problem with the use of comminuted Douglas Fir bark is that it contains lignin slivers as do all coniferous tree barks, and some workers using seed treatment dusts containing comminuted Douglas Fir bark suffer minor throat, nasal and skin irritation from the lignin slivers. Another problem is that Douglas Fir bark is much more expensive than the clay and talc diluents.

## SUMMARY OF THE INVENTION

According to the invention, there are provided methods of using comminuted Alder bark as a stimulator of germination. In one method, seeds are planted in a growth medium comprising comminuted Alder bark, and the growth medium is placed into an environment conducive to germination. In a second method, seeds are dusted with a material comprising comminuted Alder bark and are then planted. Growth media comprising comminuted Alder bark are also disclosed.

There are also provided, according to the invention, seed treatment dusts comprising:

- (a) an active ingredient;
- (b) a diluent material; and
- (c) comminuted Alder bark.

Methods of using these dusts are also disclosed.

Comminuted Alder bark functions in these seed treatment dusts as a diluent material. It is, however, a unique diluent material because it has been found, quite unexpectedly, that comminuted Alder bark, alone or in combination with other diluent materials and active ingredients, acts as an excellent stimulator of germination as compared to other diluent materials including comminuted Douglas Fir bark, clay and talc.

The use of comminuted Alder bark in seed treatment dusts also overcomes the problems presented by the use of comminuted Douglas Fir bark in such dusts. Workers using dusts containing comminuted Alder bark do not experience the minor throat, nasal and skin irritation caused by lignin slivers since the bark of the Alder tree does not contain lignin. Comminuted Alder bark is also considerably less expensive than comminuted Douglas Fir bark.

## DETAILED DESCRIPTION OF PRESENTLY PREFERRED EMBODIMENTS

The general properties of the comminuted Alder bark useful for practicing all embodiments of the invention

will first be described. Then, the use of comminuted Alder bark to stimulate germination and growth media comprising comminuted Alder bark will be described. Finally, the composition of seed treatment dusts comprising comminuted Alder bark and methods of treating seeds with such dusts will be described.

### DESCRIPTION OF COMMINUTED ALDER BARK

The comminuted Alder bark preferred for practicing the invention was purchased from Menasha Corporation, Eugene, Oreg. (sold under the name Modal) or from Asbury Waldron Inc., Marysville, Wash. (sold under the name Walderfil). Comminuted Alder bark from either source is prepared by first pulverizing bark which has been stripped from the Alder trees during the processing of the trees at the lumber mill until the particles are very small. Comminuted bark useful for practicing the invention preferably has the consistency of a powder or dust. After the bark is pulverized, it is dried to reduce the moisture content to preferably from about 6 to about 11% by weight.

Uniform particle size of the pulverized bark is important, and comminuted Alder bark which meets the following standards is preferred: 100% of the particles will pass through a 40 mesh screen, 98% of the particles will pass through a 100 mesh screen, and 91 to 97% of the particles will pass through a 200 mesh screen. Comminuted Alder bark meeting these standards is also preferred because it has the consistency of a powder or dust.

Although comminuted Alder bark having these characteristics is preferred, comminuted Alder bark of different particle sizes, different moisture contents and different consistencies may be used to practice the invention. In particular, in the growth media of the invention, it is anticipated that these characteristics can be varied substantially.

### STIMULATION OF GERMINATION BY COMMINUTED ALDER BARK

#### EXAMPLE 1

There are two types of Alder bark. Light Alder bark is bark which has laid on the log or which has been stored in piles after being stripped off the log for less than three months, preferably for less than six weeks, before being processed into comminuted bark as described above. Dark Alder bark is Alder bark which has remained on the log or which has been stored in piles after being stripped off the log for more than three months.

Derkwin wheat seeds were planted in growth media composed of: (1) 100% comminuted Douglas Fir bark, (2) 100% comminuted light Alder bark or (3) 100% comminuted dark Alder bark, and the growth media containing the seeds were placed into an enclosed growth chamber where they were maintained under identical conditions of temperature and humidity. The seeds planted in the three media were observed for fourteen days after planting.

Surprisingly, it was found that the seeds planted in the light Alder bark emerged 5 days before those planted in the Douglas Fir bark, and the seeds planted in the dark Alder bark emerged 2 days before those planted in the Douglas Fir bark. Further, at the end of fourteen days, the wheat planted in the light Alder bark was on an average 2.75 inches tall, wheat planted in the dark Alder bark was on an average 2.00 inches tall, and

wheat planted in the Douglas Fir bark was on an average 1.75 inches tall. In addition, wheat planted in the light or in the dark Alder bark was judged to exhibit better growth vigor compared to the wheat planted in the Douglas Fir bark.

The earlier germination of seeds and the better health and growth of plants in the two Alder bark media as compared to the Douglas Fir bark medium was unanticipated. These properties of the comminuted Alder bark, however, make it well suited for applications where early germination and good growth of plants is desired. Further, in view of the results of this experiment, comminuted light Alder bark is preferred for practicing the invention.

#### EXAMPLE 2

Potato seeds were cut and allowed to dry for 24 hours. After drying, the seeds were planted in growing media composed of: (1) 100% comminuted light Alder bark, (2) 100% comminuted Douglas Fir bark or (3) 100% Cyprus Talc BT 200.

Cyprus Talc BT 200 is a talc having the following chemical composition:

MgO: 30%  
SiO<sub>2</sub>: 60%  
Al<sub>2</sub>O<sub>3</sub>: 0.5%  
CaO: 2%  
Fe<sub>2</sub>O<sub>3</sub>: 2%  
Loss on ignition or oxidation: 5.5%

It contains 0.2% absorbed moisture, and the median particle size is 8 microns (range of from about 1 to about 74 microns). The loose material has a density of  $28 \pm 2$  lbs/ft.<sup>3</sup>, and the tapped material has a density of  $60 \pm 2$  lbs/ft.<sup>3</sup>. A mineral analysis of Cyprus Talc BT 200 revealed that it contained 94% talc, 2% dolomite, 2% calcite and 2% quartz. It was purchased from Cyprus Industrial Minerals Co., 555 South Flower Street, Los Angeles, Calif. 90071.

The planted seeds were observed daily, and the following results were obtained:

Medium	Days After Planting Until Emergence of Plant
100% Alder bark	21
100% Douglas Fir bark	23-24
100% Cyprus Talc BT 200	23-24

#### EXAMPLE 3

Different groups, each containing fifteen Russet Burbank potato seeds, were dusted with one of the following four dusts:

Dust A:	1% Thiabendazole 25% Comminuted light Alder bark 48% Cyprus Talc BT 200 24% Zeolite
Dust B:	100% Cyprus Talc BT 200
Dust C:	100% Comminuted Douglas Fir bark
Dust D:	1% Thiabendazole 58% Cyprus Talc BT 200 42% Zeolite

Thiabendazole is a systemic fungicide whose chemical name is 2-(4-thiazolyl)-benzimidazole which was purchased as a 98% pure material from Merck & Co., Rahway, N.J.

Zeolite is a clay which was purchased from Teague Mineral Products, Adrian, Oreg. Zeolite has the following chemical composition:

SiO<sub>2</sub>: 69.60%  
 Al<sub>2</sub>O<sub>3</sub>: 11.30%  
 K<sub>2</sub>O: 5.20%  
 Fe<sub>2</sub>O<sub>3</sub>: 1.84%  
 Na<sub>2</sub>O: 1.04%  
 CaO: 1.00%  
 MgO: 0.36%  
 TiO<sub>2</sub>: 0.30%  
 BaO: 0.20%  
 MnO<sub>2</sub>: 0.01%  
 P<sub>2</sub>O<sub>5</sub>: 0.01%  
 SiO<sub>3</sub>: 0.01%  
 PbO: 0.01%

The dusted potato seeds were planted immediately after dusting, and the potato seeds were observed daily during the germination period to ascertain the day of emergence of the seedlings. The following results were obtained:

Dust	Days After Planting Until Emergence of Plant
A	28
B	35
C	35
D	31

#### EXAMPLE 4

Three to four bounds of 100% comminuted light Alder bark were mixed in the planter box of an automated planting device with 100 pounds of bean seeds until the bean seeds were evenly dusted with the Alder bark. The dusted bean seeds were planted. Other bean seeds were planted without being dusted with comminuted Alder bark. The beans were planted at 100 pounds of beans per acre. Ten acres in the middle of a forty acre field were planted with dusted seed, and the remaining thirty acres were planted with undusted seed. During the early growing season the plants which germinated from the dusted seeds were more vigorous and healthier than the plants which germinated from the undusted seeds.

#### EXAMPLE 5

Three pounds of comminuted light Alder bark were mixed in a grain drill with 100 pounds of barley seed. The barley was planted at the rate of 120 pounds per acre. Observations during the early growing season showed that the barley which germinated from the Alder bark treated seeds grew faster and taller than the barley which germinated from the untreated barley.

#### EXAMPLE 6

Norgold variety potato seeds were dusted with the following fungicide dusts:

Dust A:	2.5% Topsin-M 25% Comminuted light Alder bark 48% Cyprus Talc BT 200 24% Zeolite
Dust B:	5% Captan 90 and 95% Cyprus Talc BT 200.

Topsin-M is a systemic fungicide whose chemical name is thiophanate-methyl, and whose true chemical names are 4,4'-o-phenylenebis(3-thioallophanate) and dimethyl-(1,2-phenylenebis(iminocarbonothioyl) bis-carbamate. Topsin-M having a guaranteed analysis of 94.5% was purchased from Gustafson, Dallas, Tex.

Captan 90 is a fungicide having the chemical name N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide which was purchased as an 85.1% pure material from either Chevron Chemical Co., 575 Market St., San Francisco, Calif. 94105 or Stauffer Chemical Co., Agricultural Chemicals Division, Westport, Conn. 06881.

It was found that seeds treated with Dust A emerged three to four days earlier and with over 30% greater stand count (the number of plants germinated and growing in a given area) than those treated with Dust B. It was also noted that after making counts of the number of stems on individual plants in ten 50-foot rows that the plants from seeds treated with Dust A had an average of 3.26 stems per plant as compared with 2.86 stems per plant for plants from seeds treated with Dust B. In order to obtain maximum crop yield, the plants should have three to four stems per plant.

#### EXAMPLE 7

A study was conducted to determine the germination and growth characteristics of wheat treated with three different seed treatment compositions containing 0.5% Thiabendazole. The study was performed as follows. First, six ounces of washed sand were placed in the bottom of containers 8 inches in diameter and 1 inch in depth. One hundred Stevens variety wheat seeds were next distributed uniformly on top of the sand, and six ounces of one of the following materials was placed uniformly over the seeds:

Material	Composition
A	0.5% Thiabendazole 99.5% Cyprus Talc BT 200
B	0.5% Thiabendazole 99.5% Comminuted Douglas Fir Bark
C	0.5% Thiabendazole 99.5% Comminuted Alder Bark

A total of ten containers were used to test each material, for a total of 30 containers, 100 seeds per container.

After the addition of materials A-C to the containers, four ounces of water were added to each container. In addition, each of the thirty total containers received two ounces of water each day during the study beginning one day after the planting of the seeds.

The temperature was between 50° and 70° F. during the period of the test. Indirect sunlight was available to the plants during the germination and growth period.

Sixteen days after the planting of the seeds, all plants emerging from the growth medium were counted using a grid for accuracy. Average plant height was also determined. The results are shown in the following table:

Treatment	Average Number Of Plants Emerged Per 100 Seeds Planted	Average Plant Height
Material A	70.3	4.3
Material B	59.3	4.3

-continued

Treatment	Average Number Of Plants Emerged Per 100 Seeds Planted	Average Plant Height
Material C	87.1	3.8

\*Not measurable due to the twisting and contortion of the leaves.

Plant vigor or health is difficult to measure. However, if the plants treated with Material C (TBZ-Alder bark) were given an index of 100, the plants treated with Material B (TBZ-Douglas Fir bark) would be rated at 50, or half the vigor of the plants treated with the TBZ-Alder bark, and the plants treated with Material A (TBZ-Cyrus Talc BT 200) would be rated at less than 25.

The following is a summary of the daily observations made on these plants over the 16 days of the test.

Material A (TBZ-Cyrus Talc BT 200):

Initial germination started about three days after planting of the seeds. However, the plant growth and emergence was extremely variable.

The leaves of the plants showed some contortion and lack of chlorophyll as early as six days after planting. Spindliness was exaggerated by ten days.

At the end of the sixteen day period, the leaves were so contorted that plant height could not be evaluated. Plant germination continued throughout the 16 day test period, but normal plant growth was lacking.

Material B (TBZ-Fir Bark):

Initial germination started three days after planting of the seeds. Emergence was more erratic and less uniform when compared to Material C (TBZ-Alder bark). About 30% of the seed showed emergence at the end of the first three days. However, the plants showed lack of vigor and were more spindly when compared to the plants treated with Material C (TBZ-Alder bark).

Some plants showed exceptional length extension after ten days of growth, but these plants were not typical healthy wheat plants. Erratic emergence and growth continued throughout the sixteen day test period.

Material C (TBZ-Alder Bark):

Initial germination started three days after planting of the seeds. Approximately 30% of the seeds showed protrusion through the surface at this time.

At the end of ten days, 60% of the plants had germinated and were at an average height about 1-1.5 inches tall. Plants were very vigorous, had a good dark green color and emerged uniformly over the planted area.

The plants continued to grow steadily and remained vigorous throughout the test period of sixteen days.

#### EXAMPLE 8

The following compositions were prepared:

Composition	Contents
A	100% Comminuted Alder bark
B	100% Comminuted Douglas fir bark
C	68% Pyrax ABB, 2.7% Topsin-M, 29% Comminuted Alder bark

-continued

Composition	Contents
D	68% Pyrax ABB, 2.7% Topsin-M, 29% Comminuted Douglas fir bark
E	48% Cyprus Talc BT 200, 24% Zeolite, 2.7% Topsin-M, 24% Comminuted Alder bark
F	48% Cyprus Talc BT 200, 24% Zeolite, 2.7% Topsin-M, 24% Comminuted Douglas fir bark
G	54% Cyprus Talc BT 200, 8.4% Captan 90, 38% Comminuted Alder bark
H	54% Cyprus Talc BT 200, 8.4% Captan 90, 38% Comminuted Douglas fir bark
I	49% Cyprus Talc BT 200, 24% Zeolite, 0.5% Thiabendazole, 24% Comminuted Alder bark
J	49% Cyprus Talc BT 200, 24% Zeolite, 0.5% Thiabendazole, 24% Comminuted Douglas fir bark
K	57% Cyprus Talc BT 200, 28% Zeolite, 10% Maneb 80, 5% Comminuted Alder bark
L	57% Cyprus Talc BT 200, 28% Zeolite, 10% Maneb 80, 5% Comminuted Douglas fir bark

The pH of these materials was determined. The results are as follows:

Composition	pH
A	5.5
B	4.8
C	5.0
D	4.2
E	5.9
F	5.6
G	5.9
H	5.5
I	6.2
J	5.9
K	5.8
L	5.8

As can be seen, all of the materials are acidic.

Next, potting soil was sterilized by heating it for 45 minutes at 140° F. After cooling, the soil was adjusted to pH 7.0 using calcium carbonate and/or sulfuric acid.

Twelve ounces of this soil was placed in 3-pint capacity plastic pots. One hundred Derkwin Spring Wheat were placed on top of the soil in one-half of each pot, and 100 Klages Spring Barley seeds were placed in the other half. Next, one ounce of one of compositions A-L was placed over the seeds. Then, two ounces of sterilized soil were placed on top of the seeds.

Four ounces of water was added to each pot after planting of the seeds, and the pots were placed in a room where temperatures averaged 55°-60° F. Water was added at the rate of 4 ounces per pot during the test period when a minimum of 50% water holding capacity was reached (determined by a tensiometer).

Growth measurements were made 19 and 28 days after planting of the seeds. The results are shown in the following tables:

Day 19 After Planting				
COMPOSITION	BARLEY		WHEAT	
	AVERAGE HEIGHT*	AVERAGE VIGOR*	AVERAGE HEIGHT*	AVERAGE VIGOR*
A	3	4.5	3	4.5

-continued

COMPOSITION	Day 19 After Planting			
	BARLEY		WHEAT	
	AVERAGE HEIGHT*	AVERAGE VIGOR*	AVERAGE HEIGHT*	AVERAGE VIGOR*
B	2.25	2	2	2
C	2.75	3.5	2.75	3.5
D	3.5	4.5	3.5	4.5
E	3.5	4.5	3.5	4.5
F	3	4	2.75	4
G	3.75	4	2.75	4.0
H	2.75	2.5	2.25	2.5
I	3.5	4	3	4
J	3.25	3	3	3
K	3.25	2.5	2	2.5
L	2.25	2.5	2.25	2.5
Untreated Control	2.75	3.5	2.75	3.5

\*NOTE:

Height: Height in inches measured from the pot rim.  
Vigor: 1-5 rating. 1 = low vigor. 5 = highest vigor.

Day 28 After Planting			25
Number of Plants Emerged Per 100 Planted			
COMPOSITIONS	WHEAT	BARLEY	
A	94	92	30
B	94	81	
C	91	85	
D	95	92	
E	96	85	
F	96	91	
G	90	95	
H	98	96	
I	97	90	
J	87	88	
K	91	83	
L	96	73	
Untreated Control	92	89	

These results show that the compositions containing Alder bark, in most cases, produced a taller, more vigorous plant by 19 days after planting than did the compositions containing Douglas Fir bark. The number of plants emerged by day 28 was, in most cases, about the same for the compositions containing Alder bark as for corresponding compositions containing Douglas Fir bark.

## EXAMPLE 9

The following materials were prepared, and the pH of each determined:

Composition	Contents	pH	55
A	100% Comminuted Douglas Fir Bark	4.8	
B	100% Comminuted Alder Bark	5.5	
C	10% Comminuted Douglas Fir Bark + 90% Washed Sand	4.4	
D	10% Comminuted Alder Bark + 90% Washed Sand	5.4	
E	100% Washed Sand	6.3	60

Twelve ounces of compositions A-E were placed in 3-pint capacity pots, and one hundred Derkwen wheat seeds were planted in each pot. The pots were watered, and the seeds grown under the same conditions as those described in Example 8.

Eight days after planting, the following measurements were obtained:

Composition	Average Height	Average Vigor	Percent Germination
A	0.5 in.	1.0	17%
B	1.0 in.	2.5	60%
C	1.0 in.	4.0	70%
D	1.25 in.	4.0	60%
E	3.0 in.	5.0	75%

Thirteen days after planting, the following measurements were obtained:

Composition	Average Height	Average Vigor	Percent Germination
A	1.0 in.	1.0	27%
B	1.5 in.	2.5	87%
C	2.5 in.	4.0	88%
D	3.5 in.	3.5	98%
E	5.0 in.	2.0	91%

Nineteen days after planting, the following measurements were obtained:

Composition	Average Height	Average Vigor	Percent Germination
A	1.5 in.	1.0	36%
B	3.0 in.	2.0	87%
C	4.0 in.	3.0	89%
D	6.0 in.	4.5	98%
E	6.0 in.	4.0	88%

The above experiment was repeated using the materials in place of A-E above:

Material	Composition
F	100% Comminuted Alder bark
G	100% Comminuted Douglas Fir bark
H	100% Comminuted Alder bark, pH adjusted to 7.0 using calcium carbonate and/or sulfuric acid
I	100% Comminuted Douglas Fir bark, pH adjusted to 7.0 with calcium carbonate and/or sulfuric acid
J	Composition C from Example 8 (Topsin-M Alder bark)
K	Composition D from Example 8 (Topsin-M Douglas Fir bark)

The following measurements were obtained:

Composition	Day After Planting Wheat Seeds	Percent Germination	Average Height (in.)
F	7	84	<0.5
	9	91	<1.0
	11	94	2.5
G	12	95	3.0
	7	58	<0.5
	9	75	<0.5
H	11	87	1.25
	12	89	1.5
	7	24	<0.5
I	9	51	<1.0
	11	63	1.25
	12	63	1.5
J	7	7	<0.5
	9	29	<0.5
	11	44	<0.5
K	12	50	<0.5
	5	47	—
	7	72	2.0
	9	86	4.0
	11	91	6.0
	12	93	7.0
	5	62	—
	7	93	1.75
	9	93	4.0
	11	97	6.0
	12	98	7.0

The results with compositions A-K show a clear superiority in percent germination and plant height produced by the compositions containing Alder bark as compared to those containing Douglas Fir bark. Also, the compositions containing Alder bark generally produced more vigorous plants than did the compositions containing Douglas Fir bark.

#### PREPARATION AND USE OF SEED TREATMENT DUSTS COMPRISING COMMINUTED ALDER BARK

The seed treatment dusts of the present invention comprise: an active ingredient; a diluent material; and comminuted Alder bark. Comminuted Alder bark is used in the dusts as a diluent material, but it is a unique diluent material because of its ability to stimulate germination as well as to perform the other functions that a diluent material ordinarily performs. As discussed above, rapid germination is a key to producing healthy productive plants.

The active ingredients used in the dusts are those known in the art, and the amount of an active ingredient used in a dust is an effective amount. These amounts are also well known.

The diluent materials used are preferably the clays and talcs. The type and amount of diluent material and the amount of comminuted Alder bark used in a dust depends on a balancing of five factors: (1) cost; (2) abrasiveness; (3) flow characteristics; (4) dustiness; and (5) drying ability. Dusts of various compositions satisfying different needs can be prepared by appropriately balancing these factors. An ideal dust would be inexpensive, slightly abrasive and non-dusty, would flow freely and would have excellent drying ability.

The cost, abrasiveness and other properties of the clay and talc diluent materials are known. The following information about the properties of comminuted Alder bark is provided to aid in the formulation of seed treatment dusts.

Comminuted Alder bark is more costly, more abrasive, but less dusty than the clays and talcs. Further,

comminuted Alder bark is a much better drying agent than are the clay and talc diluents. For example, under conditions of 50% relative humidity and temperatures in the range of 50° to 60° F., cut potato seeds dry in 2 to 2½ hours when dusted with a dust containing from about 25 to about 30% by weight of comminuted Alder bark. Under similar conditions, potato seeds dusted with a dust containing only talc or clay as the diluent material take 6 to 12 hours to dry. The faster drying time, as discussed above, translates into better disease control and less decay of seeds.

Adding up to about 40% by weight of comminuted Alder bark to a dust composed of clay and/or talc diluents improves the flow characteristics of the dust. If substantially more than 40% by weight of comminuted Alder bark is added to a dust, the dust will not flow freely and will clog the automated equipment usually used to dust and plant seeds. Further, the use of too much comminuted Alder bark in a dust causes the dust to be deposited nonuniformly on the seeds.

Accordingly, dusts of improved flow characteristics may be prepared by adding a small amount of comminuted Alder bark, usually from about 5 to about 10% by weight, to a dust otherwise composed of clay and talc diluents. Even better flow characteristics are obtained when from about 20 to about 40% by weight of comminuted Alder bark is added to the dusts, and the best flow characteristics are obtained when from about 25 to about 30% by weight of comminuted Alder bark is added to the dusts.

Dusts containing up to 40% by weight of comminuted Alder bark also cover seeds more uniformly and are more readily deposited on the seed than are dusts containing only clay and talc diluents. Using such dusts also prevents the buildup of dust which often occurs when dusts containing only clay and talc diluents are used since comminuted Alder bark is more abrasive than the clays and talcs and actually scrubs the machinery used to dust and plant seeds. Consequently, the use of dusts containing comminuted Alder bark increases planting efficiency since the use of these dusts decreases the number of instances where a planting machine becomes so clogged with dust that some seeds are not planted. The best coverage and deposition by dusts containing comminuted Alder bark and the best prevention of buildup occurs when dusts containing from about 20 to about 40%, and most preferably from about 25 to about 30%, by weight of comminuted Alder bark are used.

Once a dust has been formulated, the dust is blended. During the blending operation, the amounts of the diluent materials and of the comminuted Alder bark may have to be adjusted slightly as batches of materials vary in their moisture content. Since the moisture content greatly influences the flow and drying properties of the ingredients and of the dust, the relative amounts of each may have to be altered to obtain a dust having the proper flow and drying characteristics. Generally, the amount of each ingredient needs to be adjusted by no more than  $\pm 1\%$ .

#### EXAMPLE 10

A fungicidal seed treatment dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Pyrex ABB and Topsin-M. Pyrex ABB is a clay having the following composition:

SiO <sub>2</sub>	80.61%
Al <sub>2</sub> O <sub>3</sub>	14.76%
Fe <sub>2</sub> O <sub>3</sub>	0.29%
Na <sub>2</sub> O	0.18%
K <sub>2</sub> O	1.38%
MgO	0.02%
CaO	0.02%
TiO <sub>2</sub>	0.08%
Loss on ignition or oxidation	2.68%

Pyrax ABB was purchased from the Vanderbilt Co., 6279 Slausson Avenue, Los Angeles, Calif. 90040.

All of the ingredients were placed in a cylindrical dust blender, and the dust blender was rotated until the ingredients were thoroughly blended into a homogeneous mixture which took about 15-20 minutes. A total of one ton of potato fungicidal dust was prepared, and the final proportions were: 68.2% by weight Pyrax ABB, 2.7% by weight Topsin-M and 29.1% by weight of comminuted Alder bark. This formulation is identified as Potato Dust I in the following discussion.

#### EXAMPLE 11

A second fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200, Zeolite and Topsin-M. All of the ingredients were added to a dust blender and were thoroughly blended as described in Example 10. A total of one ton of potato fungicidal dust was prepared. The final proportions were: 48.65% by weight Cyprus Talc BT 200, 24.32% by weight of Zeolite, 2.7% by weight Topsin and 24.32% by weight of comminuted Alder bark. This formulation is identified as Potato Dust II in the following discussion.

#### EXAMPLE 12

Another fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200 and Captan 90. The ingredients were mixed in a dust blender as described in Example 10. A total of one ton of potato fungicidal dust was prepared. The final proportions were: 54.0% by weight Cyprus Talc BT 200, 8.40% by weight Captan 90 and 38.00% by weight of comminuted Alder bark. This formulation is identified as Potato Dust III in the following discussion.

#### EXAMPLE 13

A fourth fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200, Zeolite and Thiabendazole. The Thiabendazole was formulated into a pre-mix which contained 20% of Thiabendazole and 80% of Cyprus Talc BT 200 by weight.

The comminuted Alder bark, pre-mix, Zeolite and Cyprus Talc BT 200 were added to a dust blender, and the ingredients were thoroughly blended as described in Example 10. A total of one ton of potato fungicidal dust was prepared, and the final proportions were: 48.72% by weight Cyprus Talc BT 200, 24.36% by weight of Zeolite, 2.55% by weight pre-mix (0.51% Thiabendazole) and 24.36% by weight of comminuted Alder bark. This formulation is identified as Potato Dust IV in the following discussion.

#### EXAMPLE 14

A fifth fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200, Zeolite and Maneb 80. Maneb 80 is a fungicide which is the coordination product of zinc ion and manganese ethylenebis(dithiocarbamate) which was purchased as a wettable powder concentrate having a guaranteed analysis of 80% from either DuPont, Wilmington, Del. or Rohm & Haas, Philadelphia, Pa.

The ingredients were mixed as described in Example 10. A total of one ton of potato fungicidal dust was prepared. The final proportions were: 57.15% by weight Cyprus Talc BT 200, 27.83% by weight of Zeolite, 10.03% by weight Maneb 80 and 4.97% by weight of comminuted Alder bark. This formulation is identified as Potato Dust V in the following discussion.

#### EXAMPLE 15

Potatoes which weighed 8 ounces each on average were cut into 4 sections each, each section being a potato seed. The cut potato seeds were fed into a Spudnik barrel-type potato seed treatment dust dispensing apparatus. Potato Dust I was also fed into the barrel portion through a dispensing orifice. Approximately 1 pound of Potato Dust I was used to dust each 100 pounds of potato seed. As the barrel of the Spudnik apparatus rotated, the potato seeds and dust were mixed by the spiral baffles inside the barrel, and the potato seeds were covered with Potato Dust I. The dusted seeds were removed from the barrel apparatus and placed in trucks or bags where they were stored until they were planted. The cut, dusted seeds were planted within six weeks of dusting.

Potato seeds were also cut, dusted with Potato Dusts II, III, IV and V and planted as described above.

Excellent results with all five potato fungicidal dust formulations were achieved. Potato seeds dusted with these dusts germinated rapidly, and the resultant plants were healthy and vigorous. Also stand counts were high when these dusts were used. Finally, workers using the dusts reported that the dusts possessed excellent flow characteristics and were less dusty than other dusts. The workers also reported that they had experienced no irritation from lignin slivers when using the dusts.

#### EXAMPLE 16

Potato seed pieces were dusted with Potato Dust II and a dust identical to Potato Dust II, except that Douglas Fir bark was used instead of Alder bark and coated calcium carbonate was used instead of Cyprus Talc BT 200 (hereinafter Potato Dust VI). The dusted potato seeds were planted 1 foot apart in rows 25 feet long, 4 rows per treatment. The plot was located near Redfield, Iowa.

Approximately four weeks after planting, the plants were rated for stand (number of plants emerging per 50 seed pieces planted). After harvesting, the potato crop was rated for overall yield and for the yield of potatoes greater than 2 inches in length. The results are presented in the following table:

Treatment	Yield		Stand
	Total (cwt/A)	> 2 inches	
Untreated Control	257.0	161.9	22.25

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-continued

Treatment	Yield		Stand
	Total (cwt/A)	>2 Inches	
Potato Dust IV (Topsin-M + Fir bark)	251.2	176.5	22.00
Potato Dust II (Topsin-M + Alder bark)	278.1	185.9	22.50

As can be seen from the data, Potato Dust II (Topsin-M plus Alder bark) gave the highest total yield and yield of 2" or greater potatoes. Potato Dust VI containing Topsin-M and Douglas Fir bark had a yield slightly less than the untreated control.

## EXAMPLE 17

A tests was conducted in North Dakota to determine the effects of the seed treatment dusts of the invention on the growth of potatoes. In these tests, potato seed

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harvesting, the potato crop was rated for overall yield and for the yield of the various grades of potatoes.

The results are presented in the following Table. As can be seen from the data, the formulation containing Topsin-M and Alder bark (Potato Dust II) produced the highest yield for the early planted potatoes, while the formulation containing Topsin-M and Fir bark (Potato Dust VI) produced the highest yield for the late planted potatoes. There was very little difference in the final stand count between the various treatments. However, the formulation containing Topsin-M and Alder bark (Potato Dust II) gave the highest stand count for both planting dates compared to the Topsin-M and Fir bark formulation (Potato Dust VI).

With respect to decay (both soft rot and dry rot), the formulation containing Topsin-M and Alder bark (Potato Dust II) was better at controlling decay compared to the formulation containing Topsin-M and Fir bark (Potato Dust VI). This formulation also was better at controlling Rhizoctonia.

Treatment	Total Yield (cwt/acre)	Yield Grade A (%)	Stand <sup>1</sup>	Vigor <sup>2</sup>	Decay <sup>3</sup> Index	Rhizoctonia <sup>4</sup>
Untreated control (early trial)	215.1	53.9	45.0	3.42	3.80	30.1
Potato Dust II (Topsin-M + Alder bark, early trial)	225.2	55.8	48.2	3.67	0	9.3
Potato Dust VI (Topsin-M + Fir bark, early trial)	213.6	52.6	47.3	3.68	2.0	10.5
Untreated control (late trial)	227.3	51.0	48.3	3.80	0	11.1
Potato Dust II (Topsin-M + Alder bark, late trial)	223.7	48.1	49.2	3.80	0	5.7
Potato Dust VI (Topsin-M + Fir bark, late trial)	231.0	51.6	48.7	3.73	0.5	6.0
Potato Dust IV (late trial)	228.9	49.7	48.0	3.72	0	9.5
Potato Dust III (late trial)	227.9	52.2	48.0	3.70	0	11.0
Comminuted Alder bark	201.9	43.9	47.0	3.42	1.3	10.6

<sup>1</sup>Number of plants emerging per 50 potato seeds that were planted.

<sup>2</sup>Plants were rated 0-4 for vigor as follows: 1 = poor, 4 = good. The recorded number is the average of 40 plants per treatment (10 plants from each of the 4 replicate rows).

<sup>3</sup>Both soft rot and dry rot were rated 0-10 for decay as follows: 0 = no decay, and 10 = complete decay. The reported number is the combined soft rot and dry rot rating and is the average of 10 seed pieces per treatment (10 plants from each of the 4 replicate rows).

<sup>4</sup>Percent stems infected. Recorded number is average of 40 plants per treatment (10 plants from each of the 4 replicate rows).

pieces cut from Norgold Russet potatoes were treated with the following dusts: Potato Dust II (as prepared in Example 11); Potato Dust VI (See Example 16); Potato Dust III (as prepared in Example 12); and Potato Dust IV (as prepared in Example 13).

Potato seeds were cut and dusted with the various dusts and planted the following day. One batch was planted in early May (early trial), and another batch was planted 2 weeks later in May (late trial). The potato seeds were planted 1 foot apart in 50 foot rows; the rows were 38 inches apart. A total of four rows were planted for each treatment, and the plot was a randomized complete block.

The potatoes from both plantings were harvested four months after the first planting. Approximately six weeks after planting of each of the two groups, the potatoes were rated for stand counts, seed piece decay, plant vigor and the presence of certain diseases. After

## EXAMPLE 18

Potato seed pieces cut from Russet Burbank potatoes were treated with various seed treatment compositions.

All seed treatment compositions were applied at the rate of one pound per 100 pounds of seed potatoes. The freshly-cut seed pieces and the seed treatment compositions were placed into plastic bags simultaneously, and the bags shaken vigorously to help insure complete coverage.

For each seed treatment composition, fifty seed pieces were planted 12 inches apart in rows 50 feet long, with the rows 36 inches apart. The plot was a randomized complete block design with five replications for each treatment. The plot was located near Twin Falls, Id.

An additional plot was planted for use in the seed decay and stem number evaluations. Fifteen seed pieces

for each treatment were planted in each of three replications.

Stand counts (the number of plants emerging per fifty seed pieces planted) were taken 27, 33, and 35 days after planting. The small plot used for decay evaluation and stem counts was hand-harvested ten weeks after planting, and the stems counts and decay evaluations performed. The seed pieces were evaluated for decay using the following scale:

- 1=0 to trace of decay
- 2=trace to 25% of the surface decayed
- 3=25% to 50% of the surface decayed
- 4=50% to 75% of the surface decayed
- 5=75% to 100% of the surface decayed

The main yield plot was harvested 4½ months after planting. The results are shown in the following table.

Treatment	Emergence			Decay Rating	Stems/Hill	Yield	
	27 days after planting	33 days after planting	35 days after planting			Total (cwt/acre)	% U.S. #1
Alder bark blank	23.0	37.2	44.4	4.93	2.06	322	47.8
Douglas Fir bark blank	21.4	34.8	42.4	4.60	2.81	334	45.7
Potato Dust IV (Thiabendazole + Alder bark)	25.4	41.2	45.0	2.71	2.63	360	42.0
Potato Dust II (Alder bark)	18.2	33.8	40.0	3.18	2.64	340	49.3
Topsin-M + Alder bark							
Untreated Control	31.2	40.0	46.2	4.63	2.66	378	49.2

These results show that Alder bark when used alone gave consistently better emergence than did Douglas Fir bark used alone. The yields obtained using these two treatments were similar.

#### EXAMPLE 19

The test of Example 18 was repeated with Potato Dust IV. The potato seeds were planted and stand counts were made 28 and 47 days after planting. Stem counts were made, and the seed pieces were evaluated for decay 49 days after planting. The potatoes were harvested four months after planting. The results of these tests are shown in the following table.

Treatment	Emergence		Stems/Hill	Decay Rating	Yield	
	28 days after planting	47 days after planting			Total (cwt/A)	% U.S. #1
Untreated Control	9.4	47.2	2.2	2.7	385	58.3
Potato Dust IV (Thiabendazole + Alder bark)	20.6	48.6	3.3	1.9	334	54.5

None of the foregoing description of the preferred embodiments is intended in any way to limit the scope

of the invention which is set forth in the following claims. Those skilled in the art will recognize that many modifications, variations and adaptations are possible.

I claim:

1. A method of using comminuted Alder bark as a stimulator of germination which comprises: dusting a seed with a material consisting essentially of comminuted Alder bark; and planting the dusted seed.
2. A method of using comminuted Alder bark as a stimulator of germination which comprises: planting a seed in a growth medium consisting essentially of comminuted Alder bark; and placing the growth medium containing the seed into an environment conducive to germination.
3. A synthetic growth medium consisting essentially

of uncombusted comminuted Alder bark.

4. The growth medium of claim 3 wherein the Alder bark has a moisture content of from about 6 to about 11%.

5. The growth medium of claim 3 wherein the Alder bark has the consistency of a powder or dust.

6. The growth medium of claim 5 wherein the Alder bark meets the following standards:

100% of the particles will pass through a 40 mesh screen;

98% of the particles will pass through a 100 mesh screen; and

91-97% of the particles will pass through a 200 mesh

screen.

\* \* \* \* \*

## [54] SEED TREATMENT COMPOSITIONS

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696,443, Jan. 30, 1985, abandoned.[51] Int. Cl.<sup>3</sup> ..... A01N 31/04; A01N 43/78;  
A01N 47/14[52] U.S. Cl. .... 71/77; 71/23;  
71/98; 514/359; 514/366; 514/476; 514/485[58] Field of Search ..... 514/485, 476, 359, 366;  
71/77, 23, 24, 98

## [56] References Cited

## U.S. PATENT DOCUMENTS

2,314,091	3/1943	Jones	71/77
2,782,241	2/1957	Gray et al.	568/716
2,838,877	6/1958	Working	47/58
2,845,450	7/1958	Anderson et al.	560/268
2,909,869	10/1959	Dresser	71/1
3,370,957	2/1968	Wagner et al.	514/365
3,561,943	2/1971	Gay et al.	71/9
3,607,211	9/1971	Colc et al.	71/1
3,645,714	2/1972	Heming et al.	71/23
3,813,236	5/1974	Allan	71/79
3,867,324	2/1975	Clendinning et al.	523/126

3,901,838	8/1975	Clendinning et al.	523/126
3,940,257	2/1976	Sherwin et al.	71/23
3,966,708	6/1976	Casebier et al.	71/23
3,970,691	7/1976	Sears et al.	562/32
4,067,716	1/1978	Sterret	71/24
4,145,206	3/1979	Ford	71/23
4,605,668	8/1986	Takahashi et al.	514/485

## FOREIGN PATENT DOCUMENTS

2432432 1/1975 Fed. Rep. of Germany ..... 71/23

## OTHER PUBLICATIONS

Hartley et al., *The Agrochemicals Handbook*, A 391  
(1983).Secor et al., *Valley Potato Grower*, pp. 27-28 (Nov.  
1987).Chollet, *Potato Grower of Idaho*, pp. 42-43 (Jan. 1985).

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## [57]

## ABSTRACT

Methods of using comminuted Alder bark as a stimulator of seed germination and growth media comprising comminuted Alder bark are disclosed. Also disclosed are seed treatment dusts comprising an active ingredient, a diluent material and comminuted Alder bark and methods of using these dusts. The active ingredients include fungicides, insecticides and other pesticides. The diluent materials used include clays and talcs.

36 Claims, No Drawings

## SEED TREATMENT COMPOSITIONS

This application is a continuation-in-part of Applicant's pending application Ser. No. 06/859,240, filed May 7, 1986 abandoned, which was a continuation of application Ser. No. 06/696,443, filed Jan. 30, 1985, now abandoned.

### BACKGROUND OF THE INVENTION

It has long been known that the dusting of seeds prior to planting with seed treatment dusts composed of an active ingredient and one or more diluent materials would improve crop yields. The active ingredients commonly used include fungicides, insecticides, and other pesticides. The diluent materials used include clays, talcs and comminuted Douglas Fir bark.

The active ingredient of the seed treatment dust protects the newly planted seed and its developing root system from attacks by harmful organisms found in the soil during the germination period. The germination period is critical because the events that occur during this period determine, to a great extent, the health and productivity of the plant that grows from the seed. The longer a seed remains in the ground before it germinates, the more vulnerable it becomes to attack by fungi and by other soil-borne pathogens and insects. A seed attacked by soil-borne organisms is less likely to produce a healthy plant. Indeed, such a seed may not produce a plant at all.

If, however, a seed germinates quickly and is protected from attack by soil-borne organisms during the germination period, there is much less chance that the plant will become diseased or will die if it does become diseased. Since the active ingredients used in seed treatment dusts protect the seed from attack by soil-borne organisms, seeds dusted with dusts containing an active ingredient have an increased chance of producing a healthy, productive plant.

The diluent materials used in seed treatment dusts act to dry seeds. Wet seeds are susceptible to attack by bacteria while they are stored awaiting planting, and a bacterial infection may weaken the seed. A weakened seed will, in turn, produce an unhealthy plant or will not produce a plant at all.

The combination of the drying effect of the diluent materials and the fungicidal or other activity of the active ingredient protects the seed during the period prior to planting and during the germination period. Seeds thus protected are much more likely to produce high crop yields.

Seeds which are dusted include the seeds of grains, legumes, onions, tubers and flowers. In particular, the dusting of tuber seeds such as potato seeds is very desirable for the production of good crops.

Potato seeds are prepared for planting by cutting a potato into several parts. The potato seed pieces are then loaded into trucks or bags and stored until planting.

When the potato is cut, the cut sides of the potato are moist. The potato secretes a substance called suberin which begins to heal the cut surface of the potato in six to eight hours if the potato surface can dry during this time. Since the potato seed pieces are piled into bags or trucks after cutting, they would, under these circumstances, remain wet for an extended period of time. These wet conditions promote bacterial growth. Further, since the suberin cannot heal the cut surface of the

potato while it is wet, the bacteria can more easily gain access to the potato seed and start to decay the seeds. Seeds thus attacked by bacteria may be weakened before they are planted. Potato seeds and their newly developing root systems are ordinarily susceptible to insects, to fungi and to other soilborne pathogens, but a weakened seed is particularly susceptible to these harmful organisms.

If the potato seeds are dusted immediately after they are cut, the diluent materials dry the potato seeds thereby allowing the suberin to heal the cut surfaces of the potato seeds and removing an environment conducive to bacterial growth. The dusted seeds are, consequently, less likely to be weakened by bacterial decay before being planted. Further, the active ingredient in the seed treatment dust will protect the potato from attack by harmful soil-borne organisms after planting.

As mentioned above, one of the diluent materials in use is comminuted Douglas Fir bark. Comminuted Douglas Fir bark is an excellent diluent material since it is a very effective drying agent. One problem with the use of comminuted Douglas Fir bark is that it contains lignin slivers as do all coniferous tree barks, and some workers using seed treatment dusts containing comminuted Douglas Fir bark suffer minor throat, nasal and skin irritation from the lignin slivers. Another problem is that Douglas Fir bark is much more expensive than the clay and talc diluents.

### SUMMARY OF THE INVENTION

According to the invention, there are provided methods of using comminuted Alder bark as a stimulator of germination. In one method, seeds are planted in a growth medium comprising comminuted Alder bark, and the growth medium is placed into an environment conducive to germination. In a second method, seeds are dusted with a material comprising comminuted Alder bark and are then planted. Growth media comprising comminuted Alder bark are also disclosed.

There are also provided, according to the invention, seed treatment dusts comprising:

- (a) an active ingredient;
- (b) a diluent material; and
- (c) comminuted Alder bark.

Methods of using these dusts are also disclosed.

Comminuted Alder bark functions in these seed treatment dusts as a diluent material. It is, however, a unique diluent material because it has been found, quite unexpectedly, that comminuted Alder bark, alone or in combination with other diluent materials and active ingredients, acts as an excellent stimulator of germination as compared to other diluent materials including comminuted Douglas Fir bark, clay and talc.

The use of comminuted Alder bark in seed treatment dusts also overcomes the problems presented by the use of comminuted Douglas Fir bark in such dusts. Workers using dusts containing comminuted Alder bark do not experience the minor throat, nasal and skin irritation caused by lignin slivers since the bark of the Alder tree does not contain lignin. Comminuted Alder bark is also considerably less expensive than comminuted Douglas Fir bark.

### DETAILED DESCRIPTION OF PRESENTLY PREFERRED EMBODIMENTS

The general properties of the comminuted Alder bark useful for practicing all embodiments of the invention will first be described. Then, the use of comminuted

Alder bark to stimulate germination and growth media comprising comminuted Alder bark will be described. Finally, the composition of seed treatment dusts comprising comminuted Alder bark and methods of treating seeds with such dusts will be described.

### DESCRIPTION OF COMMINUTED ALDER BARK

The comminuted Alder bark preferred for practicing the invention was purchased from Menasha Corporation, Eugene Oreg. (sold under the name Modal) or from Asbury Waldron Inc., Marysville, Wash. (sold under the name Walderfil). Comminuted Alder bark from either source is prepared by first pulverizing bark which has been stripped from the Alder trees during the processing of the trees at the lumber mill until the particles are very small. Comminuted bark useful for practicing the invention preferably has the consistency of a powder or dust. After the bark is pulverized, it is dried to reduce the moisture content to preferably from about 6 to about 11% by weight.

Uniform particle size of the pulverized bark is important, and comminuted Alder bark which meets the following standards is preferred: 100% of the particles will pass through a 40 mesh screen, 98% of the particles will pass through a 100 mesh screen, and 91 to 97% of the particles will pass through a 200 mesh screen. Comminuted Alder bark meeting these standards is also preferred because it has the consistency of a powder or dust.

Although comminuted Alder bark having these characteristics is preferred, comminuted Alder bark of different particle sizes, different moisture contents and different consistencies may be used to practice the invention. In particular, in the growth media of the invention, it is anticipated that these characteristics can be varied substantially.

### STIMULATION OF GERMINATION BY COMMUNUTED ALDER BARK

#### Example 1

There are two types of Alder bark. Light Alder bark is bark which has laid on the log or which has been stored in piles after being stripped off the log for less than three months, preferably for less than six weeks, before being processed into comminuted bark as described above. Dark Alder bark is Alder bark which has remained on the log or which has been stored in piles after being stripped off the log for more than three months.

Derkwin wheat seeds were planted in growth media composed of: (1) 100% comminuted Douglas Fir bark, (2) 100% comminuted light Alder bark or (3) 100% comminuted dark Alder bark, and the growth media containing the seeds were placed into an enclosed growth chamber where they were maintained under identical conditions of temperature and humidity. The seeds planted in the three media were observed for fourteen days after planting.

Surprisingly, it was found that the seeds planted in the light Alder bark emerged 5 days before those planted in the Douglas Fir bark, and the seeds planted in the dark Alder bark emerged 2 days before those planted in the Douglas Fir bark. Further, at the end of fourteen days, the wheat planted in the light Alder bark was on an average 2.75 inches tall, wheat planted in the dark Alder bark was on an average 2.00 inches tall, and

wheat planted in the Douglas Fir bark was on an average 1.75 inches tall. In addition, wheat planted in the light or in the dark Alder bark was judged to exhibit better growth vigor compared to the wheat planted in the Douglas Fir bark.

The earlier germination of seeds and the better health and growth of plants in the two Alder bark media as compared to the Douglas Fir bark medium was unanticipated. These properties of the comminuted Alder bark, however, make it well suited for applications where early germination and good growth of plants is desired. Further, in view of the results of this experiment, comminuted light Alder bark is preferred for practicing the invention.

#### Example 2

Potato seeds were cut and allowed to dry for 24 hours. After drying, the seeds were planted in growing media composed of: (1) 100% comminuted light Alder bark, (2) 100% comminuted Douglas Fir bark or (3) 100% Cyprus Talc BT 200.

Cyprus Talc BT 200 is a talc having the following chemical composition:

MgO	30%
SiO <sub>2</sub>	60%
Al <sub>2</sub> O <sub>3</sub>	0.5%
CaO	2%
Fe <sub>2</sub> O <sub>3</sub>	2%
Loss on ignition or oxidation	5.5%

It contains 0.2% absorbed moisture, and the median particle size is 8 microns (range of from about 1 to about 74 microns). The loose material has a density of  $28 \pm 2$  lbs/ft.<sup>3</sup>, and the tapped material has a density of  $60 \pm 2$  lbs/ft.<sup>3</sup>. A mineral analysis of Cyprus Talc BT 200 revealed that it contained 94% talc, 2% dolomite, 2% calcite and 2% quartz. It was purchased from Cyprus Industrial Minerals Co., 555 South Flower Street, Los Angeles, Calif. 90071.

The planted seeds were observed daily, and the following results were obtained:

Medium	Days After Planting Until Emergence of Plant
100% Alder bark	21
100% Douglas Fir bark	23-24
100% Cyprus Talc BT 200	23-24

#### Example 3

Different groups, each containing fifteen Russet Burbank potato seeds, were dusted with one of the following four dusts:

Dust A:	1% Thiabendazole 25% Comminuted light Alder bark 48% Cyprus Talc BT 200 24% Zeolite
Dust B:	100% Cyprus Talc BT 200
Dust C:	100% Comminuted Douglas Fir bark
Dust D:	1% Thiabendazole 58% Cyprus Talc BT 200 42% Zeolite

Thiabendazole is a systemic fungicide whose chemical name is 2-(4-thiazolyl)-benzimidazole which was purchased as a 98% pure material from Merck & Co., Rahway, N.J.

Zeolite is a clay which was purchased from Teague Mineral Products, Adrian, Oreg. Zeolite has the following chemical composition:

SiO <sub>2</sub>	69.60%
Al <sub>2</sub> O <sub>3</sub>	11.30%
K <sub>2</sub> O	5.20%
Fe <sub>2</sub> O <sub>3</sub>	1.84%
Na <sub>2</sub> O	1.04%
CaO	1.00%
MgO	0.36%
TiO <sub>2</sub>	0.30%
BaO	0.20%
MnO <sub>2</sub>	0.01%
P <sub>2</sub> O <sub>5</sub>	0.01%
SiO <sub>3</sub>	0.01%
PbO	0.01%

The dusted potato seeds were planted immediately after dusting, and the potato seeds were observed daily during the germination period to ascertain the day of emergence of the seedlings. The following results were obtained:

Dust	Days After Planting Until Emergence of Plant
A	28
B	35
C	35
D	31

#### Example 4

Three to four pounds of 100% comminuted light Alder bark were mixed in the planter box of an automated planting device with 100 pounds of bean seeds until the bean seeds were evenly dusted with the Alder bark. The dusted bean seeds were planted. Other bean seeds were planted without being dusted with comminuted Alder bark. The beans were planted at 100 pounds of beans per acre. Ten acres in the middle of a forty acre field were planted with dusted seed, and the remaining thirty acres were planted with undusted seed. During the early growing season the plants which germinated from the dusted seeds were more vigorous and healthier than the plants which germinated from the undusted seeds.

#### Example 5

Three pounds of comminuted light Alder bark were mixed in a grain drill with 100 pounds of barley seed. The barley was planted at the rate of 120 pounds per acre. Observations during the early growing season showed that the barley which germinated from the Alder bark treated seeds grew faster and taller than the barley which germinated from the untreated barley.

#### Example 6

Norgold variety potato seeds were dusted with the following fungicide dusts:

Dust A:	2.5% Topsin-M
	25% Comminuted light Alder bark
	48% Cyprus Talc BT 200

-continued

Dust B:	24% Zeolite
	5% Captan 90 and
	95% Cyprus Talc BT 200.

Topsin-M is a systemic fungicide whose chemical name is thiophanate-methyl, and whose true chemical names are 4,4'-o-phenylenebis(3-thioallophanate) and dimethyl-(1,2-phenylenebis(iminocarbonothioyl)) carbamate. Topsin-M having a guaranteed analysis of 94.5% was purchased from Gustafson, Dallas, Tex.

Captan 90 is a fungicide having the chemical name N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide which was purchased as an 85.1% pure material from either Chevron Chemical Co., 575 Market St., San Francisco, Calif. 94105 or Stauffer Chemical Co., Agricultural Chemicals Division, Westport, Conn. 06881.

It was found that seeds treated with Dust A emerged three to four days earlier and with over 30% greater stand count (the number of plants germinated and growing in a given area) than those treated with Dust B. It was also noted that after making counts of the number of stems on individual plants in ten 50-foot rows that the plants from seeds treated with Dust A had an average of 3.26 stems per plant as compared with 2.86 stems per plant for plants from seeds treated with Dust B. In order to obtain maximum crop yield, the plants should have three to four stems per plant.

#### Example 7

A study was conducted to determine the germination and growth characteristics of wheat treated with three different seed treatment compositions containing 0.5% Thiabendazole. The study was performed as follows. First, six ounces of washed sand were placed in the bottom of containers 8 inches in diameter and 1 inch in depth. One hundred Stevens variety wheat seeds were next distributed uniformly on top of the sand, and six ounces of one of the following materials was placed uniformly over the seeds:

Material	Composition
A	0.5% Thiabendazole
	99.5% Cyprus Talc BT 200
B	0.5% Thiabendazole
	99.5% Comminuted Douglas Fir Bark
C	0.5% Thiabendazole
	99.5% Comminuted Alder Bark

A total of ten containers were used to test each material, for a total of 30 containers, 100 seeds per container.

After the addition of materials A-C to the containers, four ounces of water were added to each container. In addition, each of the thirty total containers received two ounces of water each day during the study beginning one day after the planting of the seeds.

The temperature was between 50 and 70° F. during the period of the test. Indirect sunlight was available to the plants during the germination and growth period.

Sixteen days after the planting of the seeds, all plants emerging from the growth medium were counted using a grid for accuracy. Average plant height was also determined. The results are shown in the following table:

Treatment	Average Number Of Plants Emerged Per 100 Seeds Planted	Average Plant Height
Material A	70.3	•
Material B	59.3	4.3
Material C	87.1	3.8

\* Not measurable due to the twisting and contortion of the leaves.

Plant vigor or health is difficult to measure. However, if the plants treated with Material C (TBZ-Alder bark) were given an index of 100, the plants treated with Material B (TBZ-Douglas Fir bark) would be rated at 50, or half the vigor of the plants treated with the TBZ-Alder bark, and the plants treated with Material A (TBZ-Cyrus Talc BT 200) would be rated at less than 25.

The following is a summary of the daily observations made on these plants over the 16 days of the test.

Material A (TBZ-Cyrus Talc BT 200): Initial germination started about three days after planting of the seeds. However, the plant growth and emergence was extremely variable.

The leaves of the plants showed some contortion and lack of chlorophyll as early as six days after planting. Spindliness was exaggerated by ten days.

At the end of the sixteen day period, the leaves were so contorted that plant height could not be evaluated. Plant germination continued throughout the 16 day test period, but normal plant growth was lacking.

Material B (TBZ-Fir Bark): Initial germination started three days after planting of the seeds. Emergence was more erratic and less uniform when compared to Material C (TBZ-Alder bark). About 30% of the seed showed emergence at the end of the first three days. However, the plants showed lack of vigor and were more spindly when compared to the plants treated with Material C (TBZ-Alder bark).

Some plants showed exceptional length extension after ten days of growth, but these plants were not typical healthy wheat plants. Erratic emergence and growth continued throughout the sixteen day test period.

Material C (TBZ-Alder Bark): Initial germination started three days after planting of the seeds. Approximately 30% of the seeds showed protrusion through the surface at this time.

At the end of ten days, 60% of the plants had germinated and were at an average height about 1-1.5 inches tall. Plants were very vigorous, had a good dark green color and emerged uniform over the planted area.

The plants continued to grow steadily and remained vigorous throughout the test period of sixteen days.

#### Example 8

Composition	Contents
A	100% Comminuted Alder bark
B	100% Comminuted Douglas fir bark
C	68% Pyrax ABB, 2.7% Topsin-M, 29% Comminuted Alder bark

-continued

Composition	Contents
D	68% Pyrax ABB, 2.7% Topsin-M, 29% Comminuted Douglas fir bark
E	48% Cyprus Talc BT 200, 24% Zeolite, 2.7% Topsin-M, 24% Comminuted Alder bark
F	48% Cyprus Talc BT 200, 24% Zeolite, 2.7% Topsin-M, 24% Comminuted Douglas fir bark
G	54% Cyprus Talc BT 200, 8.4% Captan 90, 38% Comminuted Alder bark
H	54% Cyprus Talc BT 200, 8.4% Captan 90, 38% Comminuted Douglas fir bark
I	49% Cyprus Talc BT 200, 24% Zeolite, 0.5% Thiabendazole, 24% Comminuted Alder bark
J	49% Cyprus Talc BT 200, 24% Zeolite, 0.5% Thiabendazole, 24% Comminuted Douglas fir bark
K	57% Cyprus Talc BT 200, 28% Zeolite, 10% Maneb 80, 5% Comminuted Alder bark
L	57% Cyprus Talc BT 200, 28% Zeolite, 10% Maneb 80, 5% Comminuted Douglas fir bark

The pH of these materials was determined. The results are as follows:

Composition	pH
A	5.5
B	4.8
C	5.0
D	4.2
E	5.9
F	5.6
G	5.9
H	5.5
I	6.2
J	5.9
K	5.8
L	5.8

As can be seen, all of the materials are acidic.

Next, potting soil was sterilized by heating it for 45 minutes at 140° F. After cooling, the soil was adjusted to pH 7.0 using calcium carbonate and/or sulfuric acid.

Twelve ounces of this soil was placed in 3-pint capacity plastic pots. One hundred Derkwin Spring Wheat were placed on top of the soil in one-half of each pot, and 100 Klages Spring Barley seeds were placed in the other half. Next, one ounce of one of compositions A-L was placed over the seeds. Then, two ounces of sterilized soil were placed on top of the seeds.

Four ounces of water was added to each pot after planting of the seeds, and the pots were placed in a room where temperatures averaged 55°-60° F. Water was added at the rate of 4 ounces per pot during the test period when a minimum of 50% water holding capacity was reached (determined by a tensiometer).

Growth measurements were made 19 and 28 days after planting of the seeds. The results are shown in the following tables:

COMPOSITION	Day 19 After Planting			
	BARLEY		WHEAT	
	AVERAGE HEIGHT*	AVERAGE VIGOR*	AVERAGE HEIGHT*	AVERAGE VIGOR*
A	3	4.5	3	4.5

-continued

B	2.25	2	2	2
C	2.75	3.5	2.75	3.5
D	3.5	4.5	3.5	4.5
E	3.5	4.5	3.5	4.5
F	3	4	2.75	4
G	3.75	4	2.75	4.0
H	2.75	2.5	2.25	2.5
I	3.5	4	3	4
J	3.25	3	3	3
K	3.25	2.5	2	2.5
L	2.25	2.5	2.25	2.5
Untreated Control	2.75	3.5	2.75	3.5

\*NOTE

HEIGHT: Height in inches measured from the pot rim.

VIGOR: 1-5 rating. 1 = low vigor, 5 = highest vigor.

Day 28 After Planting		
Number of Plants Emerged Per 100 Planted		
COMPOSITIONS	WHEAT	BARLEY
A	94	92
B	94	81
C	91	85
D	95	92
E	96	85
F	96	91
G	90	95
H	98	96
I	97	90
J	87	88
K	91	83
L	96	73
Untreated Control	92	89

These results show that the compositions containing Alder bark, in most cases, produced a taller, more vigorous plant by 19 days after planting than did the compositions containing Douglas Fir bark. The number of plants emerged by day 28 was, in most cases, about the same for the compositions containing Alder bark as for corresponding compositions containing Douglas Fir bark.

## Example 9

The following materials were prepared, and the pH of each determined:

Composition	Contents	pH
A	100% Comminuted Douglas Fir Bark	4.8
B	100% Comminuted Alder Bark	5.5
C	10% Comminuted Douglas Fir Bark + 90% Washed Sand	4.4
D	10% Comminuted Alder Bark + 90% Washed Sand	5.4
E	100% Washed Sand	6.3

Twelve ounces of compositions A-E were placed in 3-pint capacity pots, and one hundred Derkwen wheat seeds were planted in each pot. The pots were watered, and the seeds grown under the same conditions as those described in Example 8.

Eight days after planting, the following measurements were obtained:

Composition	Average Height	Average Vigor	Percent Germination
A	0.5 in.	1.0	17%
B	1.0 in.	2.5	60%
C	1.0 in.	4.0	70%

-continued

Composition	Average Height	Average Vigor	Percent Germination
D	1.25 in.	4.0	60%
E	3.0 in.	5.0	75%

Thirteen days after planting, the following measurements were obtained:

Composition	Average Height	Average Vigor	Percent Germination
A	1.0 in.	1.0	27%
B	1.5 in.	2.5	87%
C	2.5 in.	4.0	88%
D	3.5 in.	3.5	98%
E	5.0 in.	2.0	91%

Nineteen days after planting, the following measurements were obtained:

Composition	Average Height	Average Vigor	Percent Germination
A	1.5 in.	1.0	36%
B	3.0 in.	2.0	87%
C	4.0 in.	3.0	89%
D	6.0 in.	4.5	98%
E	6.0 in.	4.0	88%

The above experiment was repeated using the following materials in place of A-E above:

Material	Composition
F	100% Comminuted Alder bark
G	100% Comminuted Douglas Fir bark
H	100% Comminuted Alder bark, pH adjusted

-continued

Material	Composition
	to 7.0 using calcium carbonate and/or sulfuric acid
I	100% Comminuted Douglas Fir bark, pH adjusted to 7.0 with calcium carbonate and/or sulfuric acid
J	Composition C from Example 8 (Topsin-M Alder bark)
K	Composition D from Example 8 (Topsin-M Douglas Fir bark)

The following measurements were obtained:

Composition	Day After Planting Wheat Seeds	Percent Germination	Average Height (in.)
F	7	84	<0.5
	9	91	<1.0
	11	94	2.5
	12	95	3.0
G	7	58	<0.5
	9	75	<0.5
	11	87	1.25
	12	89	1.5
H	7	24	<0.5
	9	51	<1.0
	11	63	1.25
	12	63	1.5
I	7	7	<0.5
	9	29	<0.5
	11	44	<0.5
	12	50	<0.5
J	5	47	—
	7	72	2.0
	9	86	4.0
	11	91	6.0
K	5	62	—
	7	93	1.75
	9	93	4.0
	11	97	6.0
	12	98	7.0

The results with compositions A-K show a clear superiority in percent germination and plant height produced by the compositions containing Alder bark as compared to those containing Douglas Fir bark. Also, the compositions containing Alder bark generally produced more vigorous plants than did the compositions containing Douglas Fir bark.

#### PREPARATION AND USE OF SEED TREATMENT DUSTS COMPRISING COMMUNUTED ALDER BARK

The seed treatment dusts of the present invention comprise: an active ingredient; a diluent material; and comminuted Alder bark. Comminuted Alder bark is used in the dusts as a diluent material, but it is a unique diluent material because of its ability to stimulate germination as well as to perform the other functions that a diluent material ordinarily performs. As discussed above, rapid germination is a key to producing healthy productive plants.

The active ingredients used in the dusts are those known in the art, and the amount of an active ingredient used in a dust is an effective amount. These amounts are also well known.

The diluent materials used are preferably the clays and talcs. The type and amount of diluent material and the amount of comminuted Alder bark used in a dust depends on a balancing of five factors: (1) cost; (2) abrasiveness; (3) flow characteristics; (4) dustiness; and

(5) drying ability. Dusts of various compositions satisfying different needs can be prepared by appropriately balancing these factors. An ideal dust would be inexpensive, slightly abrasive and non-dusty, would flow freely and would have excellent drying ability.

The cost, abrasiveness and other properties of the clay and talc diluent materials are known. The following information about the properties of comminuted Alder bark is provided to aid in the formulation of seed treatment dusts.

Comminuted Alder bark is more costly, more abrasive, but less dusty than the clays and talcs. Further, comminuted Alder bark is a much better drying agent than are the clay and talc diluents. For example, under conditions of 50% relative humidity and temperatures in the range of 50° to 60° F., cut potato seeds dry in 2 to 2½ hours when dusted with a dust containing from about 25 to about 30% by weight of comminuted Alder bark. Under similar conditions, potato seeds dusted with a dust containing only talc or clay as the diluent material take 6 to 12 hours to dry. The faster drying time, as discussed above, translates into better disease control and less decay of seeds.

Adding up to about 40% by weight of comminuted Alder bark to a dust composed of clay and/or talc diluents improves the flow characteristics of the dust. If substantially more than 40% by weight of comminuted Alder bark is added to a dust, the dust will not flow freely and will clog the automated equipment usually used to dust and plant seeds. Further, the use of too much comminuted Alder bark in a dust causes the dust to be deposited nonuniformly on the seeds.

Accordingly, dusts of improved flow characteristics may be prepared by adding a small amount of comminuted Alder bark, usually from about 5 to about 10% by weight, to a dust otherwise composed of clay and talc diluents. Even better flow characteristics are obtained when from about 20 to about 40% by weight of comminuted Alder bark is added to the dusts, and the best flow characteristics are obtained when from about 25 to about 30% by weight of comminuted Alder bark is added to the dusts.

Dusts containing up to 40% by weight of comminuted Alder bark also cover seeds more uniformly and are more readily deposited on the seed than are dusts containing only clay and talc diluents. Using such dusts also prevents the buildup of dust which often occurs when dusts containing only clay and talc diluents are used since comminuted Alder bark is more abrasive than the clays and talcs and actually scrubs the machinery used to dust and plant seeds. Consequently, the use of dusts containing comminuted Alder bark increases planting efficiency since the use of these dusts decreases the number of instances where a planting machine becomes so clogged with dust that some seeds are not planted. The best coverage and deposition by dusts containing comminuted Alder bark and the best prevention of buildup occurs when dusts containing from about 20 to about 40%, and most preferably from about 25 to about 30%, by weight of comminuted Alder bark are used.

Once a dust has been formulated, the dust is blended. During the blending operation, the amounts of the diluent materials and of the comminuted Alder bark may have to be adjusted slightly as batches of materials vary in their moisture content. Since the moisture content greatly influences the flow and drying properties of the

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ingredients and of the dust, the relative amounts of each may have to be altered to obtain a dust having the proper flow and drying characteristics. Generally, the amount of each ingredient needs to be adjusted by no more than  $\pm 1\%$ .

#### Example 10

A fungicidal seed treatment dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Pyrax ABB and Topsin-M. Pyrax ABB is a clay having the following composition:

SiO <sub>2</sub>	80.61%
Al <sub>2</sub> O <sub>3</sub>	14.76%
Fe <sub>2</sub> O <sub>3</sub>	0.29%
Na <sub>2</sub> O	0.18%
K <sub>2</sub> O	1.38%
MgO	0.02%
CaO	0.02%
TiO <sub>2</sub>	0.08%
Loss on ignition or oxidation	2.68%

Pyrax ABB was purchased from the Vanderbilt Co., 6279 Slausson Avenue, Los Angeles, Calif. 90040.

All of the ingredients were placed in a cylindrical dust blender, and the dust blender was rotated until the ingredients were thoroughly blended into a homogeneous mixture which took about 15-20 minutes. A total of one ton of potato fungicidal dust was prepared, and the final proportions were: 68.2% by weight Pyrax ABB, 2.7% by weight Topsin-M and 29.1% by weight of comminuted Alder bark. This formulation is identified as Potato Dust I in the following discussion.

#### Example 11

A second fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200, Zeolite and Topsin-M. All of the ingredients were added to a dust blender and were thoroughly blended as described in Example 10. A total of one ton of potato fungicidal dust was prepared. The final proportions were: 48.65% by weight Cyprus Talc BT 200, 24.32% by weight of Zeolite, 2.7% by weight Topsin and 24.32% by weight of comminuted Alder bark. This formulation is identified as Potato Dust II in the following discussion.

#### Example 12

Another fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200 and Captan 90. The ingredients were mixed in a dust blender as described in Example 10. A total of one ton of potato fungicidal dust was prepared. The final proportions were: 54.0% by weight Cyprus Talc BT 200, 8.40% by weight Captan 90 and 38.00% by weight of comminuted Alder bark. This formulation is identified as Potato Dust III in the following discussion.

#### Example 13

A fourth fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200, Zeolite and Thiabendazole. The Thiabendazole was formulated into a pre-mix which contained 20% of Thiabendazole and 80% of Cyprus Talc BT 200 by weight.

The comminuted Alder bark, pre-mix, Zeolite and Cyprus Talc BT 200 were added to a dust blender, and

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the ingredients were thoroughly blended as described in Example 10. A total of one ton of potato fungicidal dust was prepared, and the final proportions were: 48.72% by weight Cyprus Talc BT 200, 24.36% by weight of Zeolite, 2.55% by weight pre-mix (0.51% Thiabendazole) and 24.36% by weight of comminuted Alder bark. This formulation is identified as Potato Dust IV in the following discussion.

#### Example 14

A fifth fungicidal dust useful for dusting potato seeds was prepared by mixing comminuted light Alder bark, Cyprus Talc BT 200, Zeolite and Maneb 80. Maneb 80 is a fungicide which is the coordination product of zinc ion and manganese ethylenebis(dithiocarbamate) which was purchased as a wettable powder concentrate having a guaranteed analysis of 80% from either DuPont, Wilmington, Del. or Rohm & Haas, Philadelphia, Pa.

The ingredients were mixed as described in Example 10. A total of one ton of potato fungicidal dust was prepared. The final proportions were: 57.15% by weight Cyprus Talc BT 200, 27.83% by weight of Zeolite, 10.03% by weight Maneb 80 and 4.97% by weight of comminuted Alder bark. This formulation is identified as Potato Dust V in the following discussion.

#### Example 15

Potatoes which weighed 8 ounces each on average were cut into 4 sections each, each section being a potato seed. The cut potato seeds were fed into a Spudnik barrel-type potato seed treatment dust dispensing apparatus. Potato Dust I was also fed into the barrel portion through a dispensing orifice. Approximately 1 pound of Potato Dust I was used to dust each 100 pounds of potato seed. As the barrel of the Spudnik apparatus rotated, the potato seeds and dust were mixed by the spiral baffles inside the barrel, and the potato seeds were covered with Potato Dust I. The dusted seeds were removed from the barrel apparatus and placed in trucks or bags where they were stored until they were planted. The cut, dusted seeds were planted within six weeks of dusting.

Potato seeds were also cut, dusted with Potato Dusts II, III, IV and V and planted as described above.

Excellent results with all five potato fungicidal dust formulations were achieved. Potato seeds dusted with these dusts germinated rapidly, and the resultant plants were healthy and vigorous. Also stand counts were high when these dusts were used. Finally, workers using the dusts reported that the dusts possessed excellent flow characteristics and were less dusty than other dusts. The workers also reported that they had experienced no irritation from lignin slivers when using the dusts.

#### Example 16

Potato seed pieces were dusted with Potato Dust II and a dust identical to Potato Dust II, except that Douglas Fir bark was used instead of Alder bark and coated calcium carbonate was used instead of Cyprus Talc BT 200 (hereinafter Potato Dust VI). The dusted potato seeds were planted 1 foot apart in rows 25 feet long, 4 rows per treatment. The plot was located near Redfield, Iowa.

Approximately four weeks after planting, the plants were rated for stand (number of plants emerging per 50 seed pieces planted). After harvesting, the potato crop

was rated for overall yield and for the yield of potatoes greater than 2 inches in length. The results are presented in the following table:

Treatment	Yield		Stand
	Total (cwt/A)	> 2 Inches	
Untreated Control	257.0	161.9	22.25
Potato Dust IV (Topsin-M + Fir bark)	251.2	176.5	22.00
Potato Dust II (Topsin-M + Alder bark)	278.1	185.9	22.50

As can be seen from the data, Potato Dust II (Topsin-M plus Alder bark) gave the highest total yield and yield of 2" or greater potatoes. Potato Dust VI containing Topsin-M and Douglas Fir bark had a yield slightly less than the untreated control.

#### Example 17

A tests was conducted in North Dakota to determine the effects of the seed treatment dusts of the invention on the growth of potatoes. In these tests, potato seed

The potatoes from both plantings were harvested four months after the first planting. Approximately six weeks after planting of each of the two groups, the potatoes were rated for stand counts, seed piece decay, plant vigor and the presence of certain diseases. After harvesting, the potato crop was rated for overall yield and for the yield of the various grades of potatoes.

The results are presented in the following Table. As can be seen from the data, the formulation containing Topsin-M and Alder bark (Potato Dust II) produced the highest yield for the early planted potatoes, while the formulation containing Topsin-M and Fir bark (Potato Dust VI) produced the highest yield for the late planted potatoes. There was very little difference in the final stand count between the various treatments. However, the formulation containing Topsin-M and Alder bark (Potato Dust II) gave the highest stand count for both planting dates compared to the Topsin-M and Fir bark formulation (Potato Dust VI).

With respect to decay (both soft rot and dry rot), the formulation containing Topsin-M and Alder bark (Potato Dust II) was better at controlling decay compared to the formulation containing Topsin-M and Fir bark (Potato Dust VI). This formulation also was better at controlling Rhizoctonia.

Treatment	Total Yield (cwt/acre)	Yield Grade A (%)	Stand <sup>1</sup>	Vigor <sup>2</sup>	Decay <sup>3</sup> Index	Rhizoctonia <sup>4</sup>
Untreated control (early trial)	215.1	53.9	45.0	3.42	3.80	30.1
Potato Dust II (Topsin-M + Alder bark, early trial)	225.2	55.8	48.2	3.67	0	9.3
Potato Dust VI (Topsin-M + Fir bark, early trial)	213.6	52.6	47.3	3.68	2.0	10.5
Untreated control (late trial)	227.3	51.0	48.3	3.80	0	11.1
Potato Dust II (Topsin-M + Alder bark, late trial)	223.7	48.1	49.2	3.80	0	5.7
Potato Dust VI (Topsin-M + Fir bark, late trial)	231.0	51.6	48.7	3.73	0.5	6.0
Potato Dust IV (late trial)	228.9	49.7	48.0	3.72	0	9.5
Potato Dust III (late trial)	227.9	52.2	48.0	3.70	0	11.0
Comminuted Alder bark	201.9	43.9	47.0	3.42	1.3	10.6

<sup>1</sup>Number of plants emerging per 50 potato seeds that were planted.

<sup>2</sup>Plants were rated 0-4 for vigor as follows: 1 = poor, 4 = good. The recorded number is the average of 40 plants per treatment (10 plants from each of the 4 replicate rows).

<sup>3</sup>Both soft rot and dry rot were rated 0-10 for decay as follows: 0 = no decay, and 10 = complete decay. The reported number is the combined soft rot and dry rot rating and is the average of 10 seed pieces per treatment (10 plants from each of the 4 replicate rows).

<sup>4</sup>Percent stems infected. Recorded number is average of 40 plants per treatment (10 plants from each of the 4 replicate rows).

pieces cut from Norgold Russet potatoes were treated with the following dusts: Potato Dust II (as prepared in Example 11); Potato Dust VI (See Example 16); Potato Dust III (as prepared in Example 12); and Potato Dust IV (as prepared in Example 13).

Potato seeds were cut and dusted with the various dusts and planted the following day. One batch was planted in early May (early trial), and another batch was planted 2 weeks later in May (late trial). The potato seeds were planted 1 foot apart in 50 foot rows; the rows were 38 inches apart. A total of four rows were planted for each treatment, and the plot was a randomized complete block.

#### Example 18

Potato seed pieces cut from Russet Burbank potatoes were treated with various seed treatment compositions. All seed treatment compositions were applied at the rate of one pound per 100 pounds of seed potatoes. The freshly-cut seed pieces and the seed treatment compositions were placed into plastic bags simultaneously, and the bags shaken vigorously to help insure complete coverage.

For each seed treatment composition, fifty seed pieces were planted 12 inches apart in rows 50 feet long, with the rows 36 inches apart. The plot was a random-

ized complete block design with five replications for each treatment. The plot was located near Twin Falls, Id.

An additional plot was planted for use in the seed decay and stem number evaluations. Fifteen seed pieces for each treatment were planted in each of three replications.

Stand counts (the number of plants emerging per fifty seed pieces planted) were taken 27, 33, and 35 days after planting. The small plot used for decay evaluation and stem counts was hand-harvested ten weeks after planting, and the stems counts and decay evaluations performed. The seed pieces were evaluated for decay using the following scale:

- 1=0 to trace of decay
- 2=trace to 25% of the surface decayed
- 3=25% to 50% of the surface decayed
- 4=50% to 75% of the surface decayed
- 5=75% to 100% of the surface decayed

The main yield plot was harvested 4½ months after planting. The results are shown in the following table.

Treatment	Emergence			Decay Rating	Stems/Hill	Yield	
	27 days after planting	33 days after planting	35 days after planting			Total (cwt/acre)	% U.S. #1
Alder bark blank	23.0	37.2	44.4	4.93	2.06	322	47.8
Douglas Fir bark blank	21.4	34.8	42.4	4.60	2.81	334	45.7
Potato Dust IV (Thiabendazole + Alder bark)	25.4	41.2	45.0	2.71	2.63	360	42.0
Potato Dust II (Alder bark)	18.2	33.8	40.0	3.18	2.64	340	49.3
Topsin-M + Alder bark)							
Untreated Control	31.2	40.0	46.2	4.63	2.66	378	49.2

These results show that Alder bark when used alone gave consistently better emergence than did Douglas Fir bark used alone. The yields obtained using these two treatments were similar.

#### Example 19

The test of Example 18 was repeated with Potato Dust IV. The potato seeds were planted and stand counts were made 28 and 47 days after planting. Stem counts were made, and the seed pieces were evaluated for decay 49 days after planting. The potatoes were harvested four months after planting. The results of these tests are shown in the following table.

Treatment	Emergence		Stems/Hill	Decay Rating	Yield	
	28 days after planting	47 days after planting			Total (cwt/A)	% U.S. #1
Untreated Control	9.4	47.2	2.2	2.7	385	58.3
Potato Dust IV (Thiabendazole + Alder bark)	20.6	48.6	3.3	1.9	334	54.3

None of the foregoing description of the preferred embodiments is intended in any way to limit the scope of the invention which is set forth in the following claims. Those skilled in the art will recognize that many modifications, variations and adaptations are possible.

I claim:

1. A seed treatment dust, comprising:

- (a) an effective amount of a fungicide;
- (b) a diluent material; and
- (c) comminuted Alder bark.

2. The seed treatment dust of claim 1 wherein the diluent material is selected from the group consisting of clays and talcs.

3. The seed treatment dust of claim 2 wherein the comminuted Alder bark is present at a concentration of from about 5 to about 40% by weight.

4. The seed treatment dust of claim 3 wherein the comminuted Alder bark is present at a concentration of from about 25 to about 30% by weight.

5. The seed treatment dust of claim 2 wherein the fungicide is Topsin-M.

6. The seed treatment dust of claim 5 wherein the diluent material is Pyrex ABB.

7. The seed treatment dust of claim 6 wherein the Topsin-M is present at a concentration of from about 2.5 to about 3.0% by weight, the Pyrex ABB is present at a concentration of from about 67.2 to about 69.2% by weight, and the Alder bark is present at a concentration

of about 28.1 to about 30.1% by weight.

8. The seed treatment dust of claim 5 wherein the diluent materials are Cyprus Talc BT 200 and Zeolite.

9. The seed treatment dust of claim 8 wherein, the Topsin-M is present at a concentration of from about 2.5 to about 3.0% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 47.6 to about 49.6% by weight, the Zeolite is present at a concentration of from about 23.3 to about 25.3% by weight, and the Alder bark is present at a concentration of from about 23.3 to about 25.3% by weight.

10. The seed treatment dust of claim 2 wherein the fungicide is Captan 90.

11. The seed treatment dust of claim 10 wherein the diluent material is Cyprus Talc BT 200.

12. The seed treatment dust of claim 10 wherein the Captan 90 is present at a concentration of from about 8.0 to about 9.0% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 53 to about

55% by weight, and the Alder bark is present at a concentration of from about 37 to about 39% by weight.

13. The seed treatment dust of claim 2 wherein the fungicide is Thiabendazole.

14. The seed treatment dust of claim 13 wherein the diluent materials are Cyprus Talc BT 200 and Zeolite.

15. The seed treatment dust of claim 14 wherein the Thiabendazole is present at a concentration of from about 0.5 to about 0.6% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 47.7 to about 49.7% by weight, the Zeolite is present at a concentration of from about 23.3 to about 25.3% by weight, and the Alder bark is present at a concentration of from about 23.3 to about 25.3% by weight.

16. The seed treatment dust of claim 2 wherein the fungicide is Maneb 80.

17. The seed treatment dust of claim 16 wherein the diluent materials are Cyprus Talc BT 200 and Zeolite.

18. The seed treatment dust of claim 17 wherein the Maneb 80 is present at a concentration of from about 9.5 to about 10.5% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 56.1 to about 58.1% by weight, the Zeolite is present at a concentration of from about 26.8 to about 28.8% by weight, and the Alder bark is present at a concentration of from about 4 to about 6% by weight.

19. A method of treating seeds, comprising: providing a dust comprising:

- (a) a fungicidally effective amount of a fungicide;
  - (b) a diluent material; and
  - (c) comminuted Alder bark; and
- dusting the seeds with the dust.

20. The method of claim 19 wherein the diluent material is selected from the group consisting of clays and talcs.

21. The method of claim 19 wherein the comminuted Alder bark is present at a concentration of from about 5 to about 40% by weight.

22. The method of claim 21 wherein the comminuted Alder bark is present at a concentration of from about 25 to about 30% by weight.

23. The method of claim 20 wherein the fungicide is Topsin-M.

24. The method of claim 21 wherein the diluent material is Pyrax ABB.

25. The method of claim 24 wherein the Topsin-M is present at a concentration of from about 2.5 to about 3.0% by weight, the Pyrax ABB is present at a concen-

tration of from about 67.2 to about 69.2% by weight, and the Alder bark is present at a concentration of from about 28.1 to about 30.1% by weight.

26. The method of claim 23 wherein the diluent materials are Cyprus Talc BT 200 and Zeolite.

27. The method of claim 26 wherein, the Topsin-M is present at a concentration of from about 2.5 to about 3.0% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 47.6 to about 49.6% by weight, the Zeolite is present at a concentration of from about 23.3 to about 25.3% by weight, and the Alder bark is present at a concentration of from about 23.3 to about 25.3% by weight.

28. The method of claim 20 wherein the fungicide is Captan 90.

29. The method of claim 26 wherein the diluent material is Cyprus Talc BT 200.

30. The method of claim 29 wherein the Captan 90 is present at a concentration of from about 8.0 to about 9.0% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 53 to about 55% by weight, and the Alder bark is present at a concentration of from about 37 to about 39% by weight.

31. The method of claim 20 wherein the fungicide is Thiabendazole.

32. The method of claim 31 wherein the diluent materials are Cyprus Talc BT 200 and Zeolite.

33. The method of claim 32 wherein the Thiabendazole is present at a concentration of from about 0.5 to about 0.6% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 47.7 to about 49.7% by weight, the Zeolite is present at a concentration of from about 23.3 to about 25.3% by weight, and the Alder bark is present at a concentration of from about 23.3 to about 25.3% by weight.

34. The method of claim 20 wherein the fungicide is Maneb 80.

35. The method of claim 29 wherein the diluent materials are Cyprus Talc BT 200 and Zeolite.

36. The method of claim 35 wherein the Maneb 80 is present at a concentration of from about 9.5 to about 10.5% by weight, the Cyprus Talc BT 200 is present at a concentration of from about 56.1 to about 58.1% by weight, the Zeolite is present at a concentration of from about 26.8 to about 28.8% by weight, and the Alder bark is present at a concentration of from about 4 to about 6% by weight.

# snake river chemicals inc.

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WHOLESALE CHEMICALS

P.O. BOX 1196

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83606 • 1196

1-28-93

TO: All IOC's in potato production areas.  
FROM: Chuck Chollet, Snake River Chemicals, Inc.  
SUBJECT: Alder Bark formulations, potato seed treat  
fungicide dusts.

We are getting a lot of questions from the field concerning our Alder Bark Formulations vs. competitive bark and talc formulations. Snake River Chemicals switched from Fir Bark and straight mineral earth diluents to Alder Bark formulations during the mid-eighty's. The positive reasons for this is listed below.

1. Alder bark is finely ground amorphous hardwood cellulose fibers and cork tissue having low irritation qualities. Fir bark under the microscope has a more definite shape best described as a slivery appearance. Microscopic lignin slivers are also present which float in the air that can cause irritation to workers around treating equipment.
2. Alder bark cellulose fibers give a wicking action to the surface moisture on the cut seed. This aids early suberization. Two or three days following treatment, test the wound healing by rubbing your thumb across the cut surface. This developing skin layer should not slip easily if good healing is taking place. Early suberization is the seed's only defense against bacterial pathogens.
3. Alder Bark formulations show excellent adherence to the cut seed surface. University and Independent research have shown consistently high retention of the formulation on the seed.
4. Alder Bark gives a much better cleaning action on planter cups than straight talc or clay diluent formulations. Fewer skips will occur where cups are free of residues.

These are the most important considerations covering the advantages of our Alder Bark diluent formulations. These fungicide dusts are blends of talcs and other mineral earth products and not Alder Bark alone. In order to build a free flowing, low dust, good adhesion product other diluents are necessary. We believe our formulations are the best balance of all these requirements.

Sales literature stressing these qualities is available from our Caldwell Office.

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